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SERIES B: MEDICAL AND VETERINARY.

VOL. IX.

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ERRATA.

Page	7	line 41	for	“*Wohlfartia*”	read	“*Wohlfahrtia*”
,,	35	,, 44	,,	“*A. hyrcanus* (*sinensis*)”	,,	“*Anopheles hyrcanus* (*sinensis*)”
,,	40	,, 22 24	,,	“*Ornithodoros*”	,,	“*Ornithodorus*”
,,	49	line 39	,,	“*sinensis*, Wied., var. *pseudopictus*, Grassi)”	,,	“*sinensis*, Wied.) var. *pseudopictus*, Grassi,”
,,	57	,, 8	,,	“*Scutophaga*”	,,	“*Scatophaga*”
,,	68	,, 3	,,	“*Lov.*”	,,	“*Lav.*”
,,	93	lines 32, 44, 48, 51	,,	“Crescents”	,,	“Sporozoites”
,,	94	lines 1 7	,,	“Crescents”	,,	“Sporozoites”
,,	100	line 32	,,	“*stictus*”	,,	“*sticticus*”
,,	105	,, 6	,,	“*M. corvina*”	,,	“*Musca corvina*”
,,	106	,, 17	,,	“Chironomid”	,,	“Chironomids”
,,	106	,, 45	,,	“*chenpodii*”	,,	“*chenopodii*”
,,	118	,, 43	,,	“*Podicipes*”	,,	“*Podiceps*”
,,	120	,, 39	,,	“onchochercosis”	,,	“onchocerciasis”
,,	132	,, 51	,,	“*kertezi*”	,,	“*kerteszi*”
,,	140	,, 21	,,	“Bagné (J.).	,,	“Bagué (J.).
,,	143	,, 16	,,	“*bifurcatus*”	,,	“*maculipennis*”
,,	184	,, 7	,,	“*tristigatum*”	,,	“*tristrigatum*”
,,	,,	,, ,,	,,	“*jalcula*”	,,	“*falcula*”
,,	216	,, 12 15	,,	“*pappatasii*”	,,	“*papatasii*”

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WALKER (E. M.). *Wohlfahrtia vigil* **(Walker) as a Human Parasite (Diptera, Sarcophagidae).**—*Jl. Parasitology, Urbana, Ill.*, vii, no. 1, September 1920, pp. 1–7, 2 plates.

Larvae of *Wohlfahrtia vigil*, Wlk., here described, have been extracted from boil-like sores on an infant in Toronto. A second case is recorded in which the parasite is considered to be identical. The larvae were subsequently fed on raw beef, and under laboratory conditions they disappeared into the soil for pupation by 29th June. The adult flies emerged about 18th July.

FANTHAM (H. B.) & PORTER (A.). **On the Natural Occurrence of Herpetomonads (Leptomonads) in the Blood of a Fish,** *Dentex argyrozona*, **and its Significance.**—*Jl. Parasitology, Urbana, Ill.*, vii, no. 1, September 1920, pp. 16–22, 1 plate.

The flagellate, *Herpetomonas denticis*, sp. n., here described, was found in the blood of a fish, *Dentex argyrozona*, near Cape Town. This is an important discovery in view of the relation between Herpetomonads and *Leishmania*.

Leishmaniases of mammals are caused by the introduction of Herpetomonads, which are parasites of invertebrates such as insects, into vertebrate hosts.

Report of Conference on Sleeping Sickness, held at Pretoria, 9th March 1920.—*Union of S. Africa Dept. Public Health.* [MS. received from Colonial Office, 23rd October 1920.]

This Conference was called in connection with the recently reported southward extension of sleeping sickness, and in particular to consider the advisability of, and precautionary measures necessary in, the introduction of native labour into Natal from the country between the Limpopo and the Zambesi.

The species of *Glossina* at present found in Zululand were stated to be *G. pallidipes*, *G. brevipalpis* and *G. austeni*, the species of trypanosomes being *Trypanosoma brucei* and *T. pecorum*. It is possible that more than one species is at present included under the name of *T. brucei*.

The work that has been done in connection with human trypanosomiasis in South Africa and Rhodesia was reviewed.

The Conference agreed that it was necessary to ensure that natives should not come to Natal from a sleeping sickness area, should not pass through the Zululand fly area, and should be effectively controlled in Natal. As natives from the country between the Limpopo and Zambesi might in certain cases have originally come from an infected area, their introduction into Natal was declared to be dangerous. At the same time recommendations were made for the control of natives entering Zululand from outside the Union, and of those entering Natal from any quarantined area.

The immediate necessity of a zoological survey of Zululand with special reference to trypanosomiasis was emphasised, and it was also considered very desirable that reliable information should be obtained as to the distribution of *Glossina,* and the presence or absence of sleeping sickness, in Mozambique.

BODKIN (G. E.). **Report of the Economic Biologist.**—*Brit. Guiana Dept. Sci. & Agric., Rept. 1918, Georgetown,* 1919, Appendix iii, 9 pp. [Received 22nd October 1920.]

From mosquito larvae collected in experimental rice plots irrigated with artesian well water the only species bred were *Culex atratus,* Theo., and *Uranotaenia geometrica,* Theo. Provided there is a good supply of running water, the danger of mosquitos breeding in these plots is thought to be negligible. During a protracted spell of dry weather, mosquitos became exceptionally abundant near Georgetown. Upon investigation it was found that they were breeding in vats containing the fresh water supply of the houses. *Stegomyia fasciata,* F. (*Aëdes argenteus,* Poiret) was the prevalent species. In a few localities *Taeniorhynchus* (*Mansonia*) *titillans,* Wlk., occurred in large numbers. The institution of artesian wells or a pipe-borne water-supply is apparently the only sure means of eliminating the breeding places.

Two species of ticks new to the Colony, *Amblyomma mantiquirense,* Arag., and *A. oblongoguttatum,* Koch, were taken on a wild hog, *Dicotyles labiatus.*

VALADEZ (S. M.). **Tiriasis de las Gallinas.** [Phthiriasis of Fowls.]—*Revista Agrícola, Mexico,* v, no. 3–4, November–December 1919, pp. 249–251, 2 figs. [Received 25th October 1920.]

The Gamasid, *Dermanyssus gallinae,* is frequently very abundant in Mexico, infesting fowls and sometimes causing severe epizootics. The mites attack the fowls at night, and in the daytime infest the walls and all parts of the poultry house, being sometimes so numerous as to form in places a sort of lining of some millimetres in thickness. Other domestic animals are subject to infestation by this mite, chiefly horses stabled near poultry houses, or dogs, cats, rabbits, etc., that frequent them.

Persons that have charge of poultry are also frequently troubled by a rash on the hands caused by the mites, the fowls themselves often being killed by the disease.

The best method of exterminating the mites is to destroy the infected poultry houses by burning, or if this is not possible, to paint them thoroughly with a lime solution. Wooden houses should be washed out thoroughly each day with boiling water. Meantime, the birds should be fumigated in special cages, one of which is described and illustrated, the whole bird, except the head, being subjected to sulphur fumes for 5 or 6 minutes. This should be sufficient to asphyxiate all parasites present.

Engelberting (—). **Die Uebertragung der Räude des Pferdes auf den Menschen.** [The Transmission of Horse Mange to Man.]—*Deutsche Tierärztl. Wochenschr., Hanover,* xxviii, no. 43, 23rd October 1920, pp. 501–502.

Whereas *Sarcoptes scabiei communis* is the only species of mite involved in human mange, several other species also occur on animals. In the latest text-books opinions vary as to the identity of the two forms of mange and as to transmission from animals to man.

As a result of investigations conducted since the end of the war, the author states that transmission from horses to man occurs more commonly than is supposed. It may take place through a chance contact or through the medium of dust containing mites or their eggs. The susceptibility of man to infestation varies in different individuals. The incubation period is short, varying from 18 hours to a few days. Most human cases recover in 2–8 weeks without special treatment if they are removed from the horses forming the source of infestation. Horses may be infested from human beings, but transmission from man to man is of the rarest occurrence.

Swellengrebel (N. H.) & Swellengrebel de Graaf (J. M. H.). **Researches on the Anophelines at some Stations of Java and Sumatra in connection with the Occurrence of Malaria.**—*Meded. Burg. Geneesk. Dienst. Ned.-Indië, Weltevreden, 1919,* no. 10, 1920, pp. 1–67, 3 plates, 1 chart, 8 maps. [Also in Dutch.]

This is chiefly an extract of reports previously published since February 1917 [*R.A.E.*, B, vii, 97, 98, etc.].

Swellengrebel (N. H.). *Myobium myzomiae,* **a parasitic** *Haplosporidium* **found in the Intestinal Tract of some Anophelinae.**—*Meded. Burg. Geneesk. Dienst. Ned.-Indië, Weltevreden, 1919,* no. 10, 1920, pp. 68–72, 2 plates. [Also in Dutch.]

A description is given of *Myobium myzomiae* found in some female examples of *Anopheles* (*Myzomyia*) *indefinitus* at Modjowarno.

Swellengrebel (N. H.) & Swellengrebel de Graaf (J. M. H.). **Malaria in Modjowarno.**—*Meded. Burg. Geneesk. Dienst. Ned.-Indië, Weltevreden, 1919,* no. 10, 1920, pp. 73–112, 9 charts, 1 plate. [Also in Dutch.]

In the four villages forming the Modjowarno group a seasonal malaria occurs from June to September. *Anopheles* (*Myzomyia*) *aconitus* is the principal carrier concerned in the yearly epidemics; it appears from April to September. *A. indefinitus* is not thought capable of starting an epidemic unaided, but can keep one going for some time. In June and July all species caught as larvae were also taken as adults, but not in the same proportion. In decreasing frequency the larval catches were: *A. barbirostris, A. aconitus, A. indefinitus, A. fuliginosus, A. hyrcanus* (*sinensis*), *A. punctulatus, A. kochi,* and *A. subpictus* (*rossi*), whereas the order of adults in decreasing frequency was: *A. indefinitus, A. aconitus, A. punctulatus, A. kochi, A. barbirostris, A. fuliginosus, A. hyrcanus,* and *A. subpictus.*

It is not possible to reduce the number of rice-fields under cultivation, but it is suggested that they should no longer be flooded after the rice has matured, that no fields be left flooded after the harvest, and that no second crop should be grown except where the prospects are very fair. If the first two points are rigorously observed, the third is of minor importance.

SWELLENGREBEL (N. H.) & SWELLENGREBEL DE GRAAF (J. M. H.). **Report on the Occurrence of Malaria and Anophelines at Samarang.** —*Meded. Burg. Geneesk. Dienst. Ned.-Indië, Weltevreden, 1919,* no. 10, 1920, pp. 113–168, 5 plates, 13 tables, 6 diagrams, 4 maps. [Also in Dutch.]

The investigations recorded here were carried out in the municipality of Samarang from July to October 1918. Two malarial centres were found, the larger one being along the coast and the smaller one at the foot of the hills. The former is a centre of permanent, the latter probably of intermittent, malaria. The larval and adult distribution of *Anopheles ludlowi* covers the coastal malaria centre. The maximum flying radius of *A. ludlowi* at Samarang is estimated at 1,700 yards; it certainly did not exceed 3,800 yards at the time the investigation was made. The natural infection index was: *A. ludlowi* 4·1, *A. subpictus* (*rossi*) 0·7, and *A. indefinitus* 0·1. By the end of November the number of Anophelines had considerably increased, though *A. ludlowi* had decreased. The difference was due to an increase of *A. subpictus* and, in the coastal villages, to an even greater increase of *A. indefinitus.*

KRAUSSE (A.). **Mittel gegen die Mücken.** [Preparations for Use against Mosquitos.]—*Zeitschr. angew. Entom., Berlin,* vii, no. 1, September 1920, p. 197.

Up to the present no repellent is known that will afford protection against mosquitos for as long as 6 or 7 hours, and further experimental work is necessary. White clothing is of some value in keeping these pests away. In Sardinia the cloth wound about the head as a protection against the sun appears to drive away mosquitos by flapping in the wind.

HEERDT (W.). **Die neuen Verfahren und Vorrichtungen zur Sanierung von ungezieferverseuchten Wohnstätten.** [The new Methods and Appliances for disinfecting Vermin-infested Dwellings.]—*Zeitschr. angew. Entom., Berlin,* vii, no. 1, September 1920, pp. 201–205.

Notes are given on the properties and action of hydrocyanic acid gas and sulphurous anhydride, and on the methods of using these substances for disinfecting habitations.

HODGKINS (J. R.). **Presence of *Gastrophilus equi* in the Dog.**—*Vet. Jl., London,* lxxvi, no. 11, November 1920, pp. 417–418.

Attention is drawn to the occurrence of *Gastrophilus equi* in a dog. The possibility of this fly maturing in such a host is however thought unlikely.

CHEETHAM (C. A.). *Anopheles bifurcatus,* **L., in Yorkshire.**—*Naturalist, London,* no. 766, November 1920, p. 362.

Adults of *Anopheles bifurcatus* are recorded in October in Yorkshire, together with *Theobaldia* (*Culicella*) *morsitans, T. annulata, Ochlerotatus nemorosus* and *Culex pipiens.*

SHERMAN (F.). **Notes on the Mosquito Fauna of North Carolina.**—*Jl. Elisha Mitchell Sci. Soc., Chapel Hill, N.C.,* xxxvi, no. 1–2, September 1920, pp. 86–93.

A sketch is given of the outstanding features of mosquito biology, and the most important remedial measures are outlined. A list of 32 mosquitos so far recorded in North Carolina is given, with brief notes relating to their specific habitats and importance as disease carriers.

BRÈTHES (J.). **Algunas Notas sobre Mosquitos Argentinos, su Relación con las Enfermedades palúdicas, etc., y Descripción de tres Especies nuevas.** [Notes on some Argentine Mosquitos, their Relation to Malaria, etc., and a Description of three new Species.]—*Anales Mus. Nac. Hist. Nat., Buenos Aires,* xxviii, 1916, pp. 193–218, 9 figs.

Much of the synonymy of Argentine mosquitos here discussed has been further considered in a later paper by Dyar [*R.A.E.*, B, vii, 107].

As regards *Anopheles* (*Cellia*) *argyrotarsis,* R.D., the author disagrees with the statement of Neiva, who in 1909 gave the distribution of this species as covering the whole of Brazil, and also with the latter's treatment of *A. albitarsis,* Lynch, as a synonym of it. [According to Dyar *A. albitarsis* is a synonym of *A. pictipennis,* Phil.] Larvae have been found in Buenos Aires and its vicinity that are in all probability of this species and of *A. annulipalpis,* Lynch, though this cannot be verified until the adults have been reared. Cases of malaria have definitely been recorded in Buenos Aires, and it is thought that this marks the South American limit of the distribution of both Anophelines and malaria. It is probable that these species are abundant further north, about Lake Iberá, in Paraguay and the south of Brazil.

Anopheles pseudopunctipennis, Theo. (*Proterorhynchus argentinus,* Brèthes) has only been recorded from Venezuela and the Argentine Republic, in spite of surveys in Peru, Bolivia, and other intermediate regions.

A Culicine, *Psorophora lynchi* [said by Dyar to be *P. tibialis,* R.D.], is described from Buenos Aires. Five species of the genus *Culex* have up to the present time been recorded from Buenos Aires and the vicinity. *Ochlerotatus* (*C.*) *confirmatus,* Lynch, has been considered synonymous with *O.* (*C.*) *scapularis,* Rond., but the author doubts this, as he considers it improbable that this species extends from the north of Mexico to the Argentine Republic, as recorded by Neiva.

Culex bonariensis, sp. n., here described, was taken in San Isidro in April and May, and it is thought that it will probably be found to be of wider occurrence. *C.* (*Choeroporpa*) *intrincatus,* sp. n., is described from a single male taken in San Isidro in May.

PERYASSÚ (A.). **Culicideos de Brazil nocivos ao Homen.** [Brazilian Culicidae injurious to Man.]—*Saúde, Rio de Janeiro,* ii, no. 1, January–February 1919, pp. 41–45.

There are 134 known species of Brazilian CULICIDAE ; this paper deals with the Anophelines, represented by 18 species, a key to which is given. The following are peculiar to Brazil: *Anopheles mattogrossensis*, *A. tibiomaculatus*, *A. gilesi*, *A.* (*Myzorhynchella*) *lutzi*, *A.* (*M.*) *parvus*, *A.* (*M.*) *nigritarsis*, *A.* (*Manguinhosia*) *lutzi*, *A.* (*Cycloleppteron*) *intermedius*, *A.* (*C.*) *pseudomaculipes*, *A.* (*Chagasia*) *fajardoi*, *A.* (*Cellia*) *braziliensis*, and *A.* (*C.*) *allopha*. The other 6 species are: *Anopheles lutzi*, *A.* (*Cycloleppteron*) *mediopunctatus*, *A.* (*C.*) *maculipes*, *A.* (*Stethomyia*) *nimbus*, *A.* (*Cellia*) *argyrotarsis*, and *A.* (*C.*) *albimanus*.

Peryassú (A.). **Biologia dos Anofelinos brazileiros.** [The Biology of Brazilian Anophelines.]—*Saúde, Rio de Janeiro*, ii, no. 2, March-April 1919, pp. 145–158.

The two principal Anopheline carriers of malaria in Brazil are *Anopheles* (*Cellia*) *albimanus* and *A.* (*C.*) *argyrotarsis*. Other vectors are *A.* (*Cellia*) *braziliensis*, *A.* (*Cycloleppteron*) *maculipes*, *A.* (*C.*) *pseudomaculipes*, *A.* (*C.*) *mediopunctatus*, *A.* (*C.*) *intermedius*, *A.* (*Myzorhynchella*) *lutzi*, *A.* (*M.*) *parvus*, and *A.* (*Stethomyia*) *nimbus*.

As regards breeding-places *A. lutzi* prefers Bromeliaceae; *A. argyrotarsis* and *A. albimanus*, springs, tanks and swamps.

Among the natural enemies of mosquitos are a number of fish such as *Girardinus caudimaculatus*, *Poecilia vopora*, *Glaridodon januarius*, and *Jenynosia lineata*.

Mattos (W. B.). **Sobre algumas Especies novas de** *Sarcophaga*. [Some New Species of *Sarcophaga*.]—*Brazil Medico, Rio de Janeiro*, xxxiv, no. 5, 31st January 1920, pp. 66–68.

Of the nine species of *Sarcophaga* found in the Brazilian state of S. Paulo, *S. paulistanensis*, *S. frerei*, and *S. neivai* are here described as new. Those already known are:—*S. chrysostoma*, Wied., *S. georgina*, Wied., *S. tessellata*, Wied., *S. plinthopyga*, Wied., *S. xanthophora*, Wied., and *S. comta*, Wied.

Bras de Sá (J. L.). **A Fauna anofelina da India Portuguêsa (2a. Communicação).** [The Anopheline Fauna of Portuguese India. 2nd Communication].—*Bol. Geral Med. e Farmácia, Nova Goa*, Ser. V, no. 8, August 1919, pp. 290–294.

The Anophelines found at Goa are: *Anopheles subpictus* (*rossi*), *A. ludlowi*, *A. stephensi*, *A. jamesi*, *A. fuliginosus*, *A. listoni*, *A. barbirostris*, *A. hyrcanus* (*sinensis*), *A. elegans*, *A. culicifacies* and *A. maculatus*. A key is given to these species and to three others, *A. aitkeni*, *A. karwari*, and *A. pulcherrimus*, previously recorded from Goa, but not observed in these investigations.

Connor (M. E.). **Yellow Fever Control in Ecuador. Preliminary Report.**—*Jl. Amer. Med. Assoc., Chicago, Ill.*, lxxiv, no. 10, 6th March 1920, pp. 650–651.

This paper describes the campaign against *Stegomyia* [*fasciata*] at Guayaquil since 24th November 1918. The decrease of yellow fever coincided with the screening of water-tanks and other containers. There are nearly 7,000 tanks in use in the city, as the pipe-borne supply is inadequate. Nearly 30,000 other containers had to be inspected. The tanks were covered with either copper wire screens, galvanised iron, or wooden covers. Galvanised iron proved the most satisfactory and cheapest. Wooden covers were often taken and used for firewood, and the copper screens admitted rats.

Fish were also used. One of the perch family was found to be a voracious destroyer of the larvae, but its habit of jumping 3 or 4 feet out of the water in order to escape led to its replacement by two other native species, which gave good results.

MONZIOLS (—) & COLLIGNON (—). **Quelques Faits cliniques et épidémiologiques intéressants observés à Constantinople au Cours de l'Epidémie de Peste de 1919.**—*Bulls. et Méms. Soc. Méd. Hôpitaux de Paris,* xxxvi, no. 5–6–7, 26th February 1920, pp. 215–217.

From October to December 1919 the authors were able to observe 44 cases of plague among the civil population of Constantinople. Rats tend to avoid infected foci, and it was found impossible to capture a living specimen in the mill where the epidemic started. All the dead rats found were *Mus rattus.* Fleas were present in thousands on the ground and on the sacks of flour. A count gave the following percentages: *Ctenocephalus canis* and *C. felis* 5, *Pulex irritans* 25, *Xenopsylla cheopis* 70.

DA MATTA (A.). **Um novo Redúvido do Amazonas**: *Rhodnius brèthesi,* **n. sp.** [*R. brèthesi,* a new Reduviid from the Amazons.]—*Amazonas Medico, Manaos,* no. 7 (ii, no. 3), July–September 1919, pp. 93–94, 1 plate.

The information given here has already been noticed from another source [*R.A.E.*, B, viii, 41].

DA MATTA (A.). **Notas para o Estudo da Biologia do** *Rhodnius brèthesi,* **n. sp.** [Notes for the Study of the Biology of *R. brèthesi.*]—*Amazonas Medico, Manaos,* no. 7 (ii, no. 3), July–September 1919, pp. 104–107.

In the Brazilian forests the Reduviid bug, *Rhodnius brèthesi,* da Matta, is commonly found on a palm (*Leopoldina piassaba*), which attracts many mammals on account of its fruit and the shelter it affords. Its fibres are put to several uses, and this circumstance brings the bug into contact with man.

GOLDSCHMIDT (W.). **Einige Bemerkungen zur Frage der Ophthalmomyiasis.** [Some Remarks on the Question of Ophthalmomyiasis.]—*Wiener Klin. Wochenschr., Vienna,* xxxii, no. 48, 27th November 1919, pp. 1159–1160. (Abstract in *Trop. Dis. Bull., London,* xvi, no. 2, 15th August 1920, p. 109.)

The author has observed cases of ophthalmomyiasis, chiefly among children, in Central Asia, due to young maggots of *Wohlfartia* (*Sarcophila*) *magnifica,* a viviparous fly well known in Europe to deposit its larvae in the nasal passages of man.

FIEBIGER (J.). **Zur Frage der Ophthalmomyiasis.** [The Question of Ophthalmomyiasis.]—*Wiener Klin. Wochenschr., Vienna,* xxxiii, no. 5, 29th January 1920, p. 109.

Recorded cases of larvae of *Rhinoestrus purpureus* and *Oestrus ovis* infesting the conjunctival sac of man are referred to in this paper.

TYZZER (E. E.) & WALKER (E. L.). **A Comparative Study of** *Leishmania infantum* **of Infantile Kala Azar and** *Leptomonas* (*Herpetomonas*) *ctenocephali* **parasitic in the Gut of the Dog Flea.**—*Jl. Med. Research, Boston, Mass.*, xl, no. 2, July 1919, pp. 129–176. (Abstract in *Trop. Dis. Bull., London*, xv, no. 6, 15th June 1920, pp. 439–441.)

Investigations were undertaken to determine, if possible, the generic and specific relationship of the above two organisms. The material used was obtained in the case of *Leishmania infantum* from a case of infantile kala-azar in a Greek child in Massachusetts; in the case of *Leptomonas* (*Herpetomonas*) *ctenocephali* from fleas collected on dogs in San Francisco and Boston. The conclusion reached is that the two organisms are not identical.

STORY (C.). **The Spinose Ear-tick. Practical Suggestions for Suppression.**—*Union S. Africa Jl. Dept. Agric., Pretoria*, i, no. 7, October 1920, pp. 647–654, 5 figs.

This paper, which gives an account of studies on the spinose ear-tick [*Ornithodorus megnini*, Dugès], is reprinted from the *Farmer's Weekly*, 10th December 1919, p. 1977, with comments by Mr. Lounsbury. The chief points of difference between the observations here described and those of previous authors [*R.A.E.*, B, i, 139; vi, 32; vii, 93] are in the hiding places of the adult ticks and the habits of the young larvae. The favourite hiding place appears to be the loose, dry manure that fills the spaces between the stones at the bottom of the kraal wall and for some distance inwards, and numbers of adults and newly-hatched larvae were found in this situation. The larvae are described as crawling to their host, not waiting to be picked up as the animal passes, as do Ixodid ticks.

Instances are recorded of natives working about cattle kraals being attacked by *O. megnini*. This tick also occasionally feeds on the skin in the case of sheep.

O. megnini is much more a pest of the kraal than of the veldt. As mating takes place away from the host, the chances are against the females finding the males in the open; and as the unfed larvae are short-lived, as compared with Ixodids, their chances of finding a host in the open are proportionately reduced.

Young calves suffer most from this pest. Its bite seems to be highly poisonous, producing swelling and abscesses, and ultimately death. Infested kraals and cattle may be cleaned by systematic ear dressing about once a fortnight in the manner described [*loc. cit.*, vi, 32]. Care must be taken not to smear the tar mixture on the hair in the ear, otherwise when the ear is flapped the mixture reaches the eye and causes rather severe irritation.

BRUG (S. L.). **Onderzoek naar de Geschiktheid van** *Culex fatigans* **te Batavia als Overbrenger van** *Filaria bancrofti*. [An Investigation into the Capacity of *C. fatigans* at Batavia to convey *F. bancrofti*.]—*Geneesk. Tijdschr. Ned.-Indië, Batavia*, lx, no. 4, 1920, pp. 612–615.

Infection with *Filaria bancrofti* is comparatively rare at Batavia, and this was thought to be perhaps due to a reduced susceptibility to infection on the part of Batavian mosquitos. *Culex fatigans*, known to be a good carrier of filariasis, is common locally, and this species was subjected to an investigation. As a result it appears that the parasite develops quite as well in *C. fatigans* at Batavia as it does elsewhere. The problem therefore remains unsolved. It is perhaps possible that in freedom the mosquitos prefer to feed on healthy human beings rather than on individuals suffering from filariasis.

DYAR (H. G.). **The Classification of American** *Aëdes* **(Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus, Washington, D.C.*, viii, no. 7–9, July–September 1920, pp. 103–106.

The American species of *Aëdes* are here divided into subgenera on the characters of the male hypopygium [*R.A.E.*, B, vi, 142]. A key is given to the subgenera in question, viz., *Howardina, Heteronycha Taeniorhynchus, Finlaya, Stegomyia, Aëdes* and *Ecculex*. *Heteronycha* is also divided into groups, using the same characters, and a key is given with a list of the species in each group. The present arrangement replaces that given formerly [*loc. cit.*].

DYAR (H. G.). **The American** *Aëdes* **of the** *stimulans* **Group (Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus, Washington, D.C.*, viii, no. 7–9, July–September 1920, pp. 106–120.

Notes are given on the adults and larvae of the American *Aëdes* of the *stimulans* group of the subgenus *Heteronycha* [see above]. This group is divided, with a key, into series, species and subspecies. The following new subspecies are described :—*Aëdes stimulans mississippii, A. stimulans classicus* and *A. stimulans albertae.*

DYAR (H. G.). **The Larva of** *Aëdes campestris*, **Dyar & Knab (Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus, Washington, D.C.*, viii, no. 7–9, July–September 1920, p. 120.

The larva of *Aëdes campestris*, found in salt marshes in Utah, is described.

DYAR (H. G.). **A Note on** *Aëdes niphadopsis*, **Dyar & Knab (Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus, Washington, D.C.*, viii, no. 7–9, July-September 1920, pp. 138–139.

The male and larva of *Aëdes niphadopsis* are here described from Utah, the female only having been previously known [*R.A.E.*, B, vi, 86].

DYAR (H. G.). **The** *Grabhamia* **Group of** *Psorophora* **(Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus, Washington, D.C.*, viii, no. 7–9, July–September 1920, pp. 140–141.

The species of the *Grabhamia* group of *Psorophora* are themselves divided into two series, in the second of which, comprising the *jamaicensis* group, it is considered that too many names have been recognised. Of the four species here given as comprising the latter group, one, *Psorophora funiculus*, from Colombia, is described as new.

MacDougall (A. H.). **Spraying as a Preventive for Blow-flies.**—*Agric. Gaz. N.S.W., Sydney,* xxxi, no. 9, September 1920, pp. 617–618.

As a result of experiments (which are still in progress) one part of carbolic dip to ten parts of water is recommended for the treatment of sheep infested with blow-flies. The affected part should be shorn fairly closely, and a weaker solution should be used if the flesh is raw.

Cohen (L.). **The Control of Cattle Tick.**—*Agric. Gaz. N.S.W., Sydney,* xxxi, no. 9, September 1920, p. 654.

It has been thought that arsenic oxide appearing in dips as the result of oxidation of arsenious oxide has less effect on ticks than the original form. The results of experiments carried out in Queensland show that arsenate possesses a tick-killing power of about one-third that of arsenite. Arsenical fluids apparently act more rapidly in summer than in winter, and it is thought that weaker solutions applied at shorter intervals, *i.e.*, a 5 lb. solution with a four-day interval, might be more successful than the present method of an 8 lb. solution at 5 to 10 day intervals. Arsenate up to 0·3 per cent. by itself, or up to 0·2 per cent. combined with 0·1 per cent. of arsenite, has no noticeably injurious effect on cattle. The departmental mixture at full arsenical strength has no deleterious effect on cattle, including dairy cows in full milk, but even at less than half standard arsenical strength it will kill all ticks except those undergoing the second moult at the time of treatment, and these apparently resist all commonly employed concentrations. Emulsion is not essential to the dip fluid, provided a thorough wetting of every part of the animal is ensured.

Newstead (R.) & Morris (H. M.). **Report on the Non-parasitic or Forage Acari of the Family Tyroglyphidae.**—*Rept. Grain Pests (War) Committee, Royal Society, London,* no. 8, 1920, pp. 16–25, 6 plates. [Received 4th November 1920.]

Certain Acarids frequently found upon domestic animals are non-parasitic, but have accidentally been carried to an animal host owing to their presence in some form of forage on which the animals are fed, or in the dust about beams and ledges of a stable, whence they can easily be transferred to a living host by contact or by flies. These mites are usually harmless, but certain species, when very numerous, may cause considerable irritation. In skin-scrapings from animals they are frequently mistaken for mange Acarids.

Various records of the occurrence of such mites on animal hosts, reported by previous authors, are quoted. The characteristics differentiating mange mites, or Sarcoptids, from forage acari, or Tyroglyphids, are described, and a key is given for the determination of mange mites of the genera *Psoroptes, Sarcoptes* and *Symbiotes* and of the forage mites.

Brief descriptions are given of the following Tyroglyphids:—*Tyroglyphus* (*Aleurobius*) *farinae,* de G., which is probably the commonest of the forage Acarids, occurring in meal, bran, maize, wheat, flour, cheese, etc. It is frequently found in skin scrapings from horses, and has also recently been found in the ears of a guinea-pig. *Histiogaster entomophagus,* Lab., is considered a pest of primary importance in connection with the storage of flour and mixed farinaceous foodstuffs. *Glyciphagus cadaverum,* Schr., has been found very abundantly in wheat and mixed screenings, chaff, etc. ; *G. domesticus*, de G., has recently been taken in the ears of a guinea-pig and of a rabbit ; *G. ornatus*, Kram., has been taken from skin-scrapings from army horses in France, but has not yet been recorded in the British Isles ; *G. plumiger*, Koch, and *G. canestrinii*, Arm., are said to occur among hay in barns, etc., but have not been found by the authors. *Chortoglyphus arcuatus*, Troup, has been found in flour and in dust, etc., on the beams and floors of stables and barns. *Tyroglyphus longior*, Gerv., and *T. siro*, L., which are very similar in appearance, are commonly met with in the hypopial stage, and have also been recorded in skin scrapings from horses in France and Flanders.

Most of the forage Acarids that are found on domestic animals are in the hypopial nymph stage, though this stage does not occur in the life-cycle of all individual mites and is apparently much commoner in some species than in others. The mites in this stage are more resistant to extremes of heat and drought, and are frequently more active than at other times.

Cheyletus eruditus, Schr., which has been taken in groomings from healthy army horses in France and Flanders and also in the ears of a guinea-pig, is predaceous upon many of the above-mentioned Acarids, though it has never been found in sufficient numbers to be very highly beneficial [*R.A.E.*, A, vii, 92.]

PILLERS (A. W. N.). **Clinical Notes on the Non-parasitic or Forage Mites.**—*Rept. Grain Pests* (*War*) *Committee, Royal Society, London*, no. 8, 1920, pp. 26–28. [Received 4th November 1920.]

Microscopical examinations of scrapings taken from a very large number of animals evacuated for mange and contagious skin diseases during a period of the War showed that 14·73 per cent. harboured forage acari. Repeated records show that in time of war there is a close relationship between grain Acarids and those known to cause mange. Moreover, during harvesting, transport, milling and storage operations the horse is brought into close contact with the Acarids contained in grain. In all moist conditions of the skin, casual mites may adhere accidentally to wet places, but are not necessarily the cause of disease. Sarcoptid mites are difficult to find in the early phases of sarcoptic mange, and as a defence for the presence of unnotified mange it has been urged that the disease was due to forage acari, which are easily confused with the mange mites. It seems possible also that some of the obscure cases of shaking of the head in horses, sometimes followed by disastrous results in runaways, may be due to forage acari having gained access to the sensitive lining of the auditory canal. It is therefore of great importance to recognise the non-parasitic acari that occur more or less accidentally on the skin of domestic animals.

Hygiène. Mesures à prendre pour combattre la Maladie du Sommeil. [Measures to combat Sleeping Sickness in the Belgian Congo.]—*Bull. Off. Congo Belge, Brussels*, 13th Year, no. 10, 15th October 1920, pp. 1229–1256.

This ordinance on sleeping sickness was issued on 8th July 1920 at Boma by the Governor-General of the Belgian Congo in view of the need for new measures. The previous legislation on the subject is reviewed, and details of the restrictions on the movements of both natives and Europeans entering or leaving infected areas are given.

Clearing must be done on the banks of rivers, lakes, lagoons, at European undertakings, native villages, plantations, washing places, watering places, fords, landing places, bridges, places where native salt is prepared by means of water-plants, and breeding-places of *Glossina*. The banks must be cleared for a width of 50 metres at high-water level for at least 1,000 metres above and below the point to be protected. Trees more than 5 metres high may be left standing provided that all branches up to 4 metres from the ground are lopped off and that each tree has a clear radius of at least 15 metres around it. If a river is less than 500 metres wide, the opposite bank must be cleared as well, even if uninhabited. The débris from the clearing must be dried and burned. The work of clearing must be done by the occupiers or proprietors of the land, and in default it will be done at their expense by the Government. European undertakings and native villages away from water may be required to carry out clearings within a zone specified by the territorial authorities.

Fishing on waters registered as fly-infested requires a local permit, which is only given to non-infected persons. Infested waters may not be crossed at prohibited points, and no camping is allowed within 500 metres of their banks.

The limits of infected districts may be surveyed by the authorities and made known by means of posters or public proclamation. Natives living in the districts bordering on the districts of the Lower Welle, Upper Welle, Ituri, and Kivu are forbidden to enter them, but this prohibition may be raised by the Vice-Governor-General of the Eastern Province. Access to other frontier districts may be likewise regulated by the competent authorities.

New villages, settlements, or halts must be at least 1,000 metres from any water or swamp with uncleared banks. Stables and cattle sheds must be placed at a distance (specified by the medical authorities) from dwellings, and in localities infested with fly, no cattle, pigs, horses, donkeys, or mules may be allowed nearer than 500 metres from a dwelling.

Wood used as fuel for steamers must be cut at a considerable distance from the banks and must be transported to them after sunset. On railways, steamers, and other transport systems all places where the presence of staff or passengers is involved must be cleared. Passenger coaches, cattle trucks and other wagons must be screened, and their doors kept closed.

The ordinance closes by defining the authorities charged with its administration and with a statement of the penalties incurred by disregard of its provisions.

TEJERA (E.). **La Tripanosomiosis Americana o Enfermedad de Chagas en Venezuela.** [American Trypanosomiasis or Chagas' Disease in Venezuela.]—*Anales Direc. San. Nac., Caracas,* i, no. 1–2, January–June 1919, 73–84, 3 figs. [Also in English.]

The information given in this paper has already been noticed [*R.A.E.*, B, viii, 16].

NUÑEZ TOVAR (M.). **Nota sobre dos Conorinos del Estado Aragua.** [Notes on two *Conorhinus* from the State of Aragua, Venezuela.]—*Anales Direc. San. Nac., Caracas,* i, no. 1–2, January–June 1919, pp. 86–89, 2 figs. [Also in English.]

Among a number of *Triatoma* (*Conorhinus*) captured, two new species are illustrated and briefly described, though not named.

Venezuelan Reduviids have a marked preference for roofs recently thatched with Guinea grass, in which they multiply in such numbers as to make the huts uninhabitable.

Rivas (J. A.). **Contribución al Estudio de los Ixodes de Venezuela.** [A Contribution to the Study of the Ixodidae in Venezuela.]—*Anales Direc. San. Nac., Caracas*, i, no. 1–2, January–June 1919, pp. 112–119. [Also in English.]

There is no new information in this paper, which briefly describes the following ticks:—*Rhipicephalus sanguineus punctatissimus*, Gerst., transmitting *Piroplasma* (*Babesia*) *canis* to dogs; *R. simus*, Koch, transmitting *Theileria parva* to cattle; *R. bursa*, Can., suspected of transmitting *Piroplasma ovis* to sheep; *Margaropus annulatus australis*, Fuller, from which it is possible to infect cattle with *Piroplasma bovis*; *Amblyomma cajennense*, F.; *A. americanum*, L.; *A. concolor*, Neum.; and *Dermacentor nitens*, Neum.

Nuñez Tovar (M.). **Fauna Anofelina de Venezuela.** [The Anopheline Fauna of Venezuela.]—*Anales Direc. San. Nac., Caracas*, i, no. 3, July–September 1919, pp. 255–256. [Also in English.]

The *Anopheles* of Venezuela are:—*A. tarsimaculatus*, *A. punctipennis*, *A. pseudopunctipennis*, *A. argyrotarsis*, *A. albimanus*, and one species as yet unidentified.

Nuñez Tovar (M.). **Nota Sobre un Brote de Tristeza en el Estado Aragua.** [Observations on an Outbreak of Texas Fever in the State of Aragua, Venezuela.]—*Anales Direc. San. Nac., Caracas*, i, no. 4, October-December 1919, pp. 434–437. [Also in English.] [Received 10th November 1920.]

Observations are recorded on an outbreak of Texas fever in Venezuela in 1919. It is not known in what other parts of Venezuela the disease occurs, but its distribution probably includes all territory where climatic conditions are favourable to ticks. While certain ticks are the usual transmitting agents of *Piroplasma bigeminum*, the specific cause of the disease, recent observations indicate the possibility of certain blood-sucking Diptera, such as *Stomoxys calcitrans*, also acting as intermediate hosts.

In the various countries where the disease is endemic there are certain differences in the clinical manifestations and a number of different ticks act as vectors. The collection of ticks obtained on the present occasion from 50 cases of Texas fever was composed entirely of adult examples of *Boophilus annulatus*.

Christophers (S. R.). **A Summary of recent Observations upon the *Anopheles* of the Middle East.**—*Indian Jl. Med. Res., Calcutta*, vii, no. 4, April 1920, pp. 710–716, 3 maps. [Received 7th November 1920.]

The distribution of the Anopheline fauna of Asia Minor, Syria, Palestine, Arabia, Mesopotamia, Persia, Turkestan, Afghanistan and Baluchistan is discussed. The species involved include *A. pulcherrimus*, Theo., *A. pharoensis*, Theo.; *A. superpictus*, Grassi; *A. turkhudi*, List.; *A. maculipennis*, Meig.; *A. bifurcatus*, L.; *A. plumbeus*, Hal.; *A. stephensi*, List.; *A. hyrcanus*, Pall. (*sinensis*, Wied.); *A. costalis*, Lw.; *A. rhodesiensis*, Theo.; *A. pretoriensis*, Theo.; *A. cinereus*, Theo.; and *A. culicifacies*, Giles.

The Anopheline fauna of South Arabia is definitely African. The European facies continues at least as far east as the south shores of the Caspian Sea and also predominates in Palestine, Syria and Cilicia.

Donovan (C.). **Malaria of Monkeys at the Foot of the Nilgiris.**—*Indian Jl. Med. Res., Calcutta,* vii, no. 4, April 1920, pp. 717–721, 1 plate. [Received 7th November 1920.]

As a result of frequent statements that malaria may be contracted in India in areas where there are no human beings, the common monkeys, *Macacus sinicus* and *Presbytis priamus,* were examined for the presence of malarial parasites. Of 86 individuals examined none contained a malarial organism of any kind, but the Malabar squirrel (*Ratufa indica malabarica*) was frequently found to be infected with *Plasmodium ratufae,* sp. n., which closely resembles *P. vivax* found in man. The so-called uninhabited malarious tracts at the foot of the Nilgiris frequently have wild tribes wandering through and living in them.

Since writing this paper the author has recorded a case of *Macacus sinicus* infected with a *Plasmodium* morphologically identical with *P. cynomolgi* found in *Macacus cynomolgus.*

P. pitheci has been found in the orang-utang and *P. kochi* in *Cercopithecus* sp.

Patton (W. S.). **Some Notes on the Arthropods of Medical and Veterinary Importance in Mesopotamia, and on their Relation to Disease. Part i. The Gad Flies of Mesopotamia.**—*Indian Jl. Med. Res., Calcutta,* vii, no. 4, April 1920, pp. 735–750, 1 plate, 2 figs. [Received 7th November 1920.]

The Tabanids described from Mesopotamia include *Tabanus pulchellus,* Lw. (*cyprianus,* Ric.), which appears in small numbers in April, but later becomes extremely common and only disappears in September or early October. Females of this species have been caught from 5 to 6 miles away from the breeding grounds. Numerous individuals are destroyed by dragonflies and a species of bee-eater (*Merops apiaster*). *T. persis,* Ric., was almost always found in company with the above-named species, but was less numerous.

T. glaber, Big., was very common from about August to November ; it was found breeding along the banks of a creek, and apparently does not breed in marshy areas. *T. polygonus,* Wlk., attacks mules and horses from March to September, and breeds chiefly along the banks of creeks. *T. pulverifer,* Wlk., occurred in the marshy area along the Euphrates. *T. sufis,* Jaen., breeds along banks of creeks and water-courses. It has been recorded from other places under the name of *T. alboventralis,* Newst. *Chrysops punctifer,* Lw., was common along creeks and water-courses in April and May. Only two examples of the genus *Haematopota* were taken, and these were too much damaged to be identified.

During the campaign of 1915–1917 more than a thousand camels were lost as the result of a fatal form of trypanosomiasis. Several individuals from Sind escaped infection, although some of these were present during two fly seasons, which would suggest that they were immune to the Mesopotamian variety of trypanosome.

Except for a few individuals of *Tabanus pulchellus, T. glaber* was the only species seen feeding on camels, and is apparently responsible for the transmission of the disease. A species of *Crithidia* closely resembling *C. tabani* was isolated from the hind-gut of this fly, but no parasites were found in the salivary glands. The camels were noticed trying to drive the flies away by licking, thus infecting their lips with various stages of the parasite. It is suggested that the parasite ingested by the flies from the blood of the animals is a stage of *Crithidia* parasitic in the fly, and when it comes in contact with the mucous membrane of the mouth of the vertebrate host, it penetrates it and enters the blood, assuming the trypanosome stage. Experiments to prove this theory were interrupted, but their resumption is urged.

Observations on trypanosomiasis of camels in various parts of the world are reviewed ; from these it appears that Tabanids only act as mechanical carriers, and that trypanosomes soon disappear from their alimentary tracts.

Owing to the enormous extent of the breeding areas the artificial destruction of the early stages of these flies would be quite impossible, but Chalcids parasitic on the eggs might be introduced with advantage. All horses should be protected from the flies by housing in reed huts.

PATTON (W. S.). **Some Notes on the Arthropods of Medical and Veterinary Importance in Mesopotamia, and on their Relation to Disease. Part ii. Mesopotamian House Flies and their Allies.**— *Indian Jl. Med. Res., Calcutta,* vii, no. 4, April 1920, pp. 751–777, 4 plates, 6 figs. [Received 7th November 1920.]

The house-flies described from Mesopotamia include *Musca determinata,* Wlk., the generations of which under favourable conditions may succeed one another in from 72 to 90 hours. The eggs are laid in excrement and decomposing matter. *M. humilis,* Wied., is widely distributed and the early stages are very similar to those of *M. determinata.* This species breeds in cow-dung and isolated patches of human excreta. The eggs of *M. mesopotamiensis,* sp. n., are laid singly in patches of cow-dung in the field. The larvae migrate some distance and enter the ground for pupation. From puparia collected in October and November the adults emerged in March, hibernation thus occurring in the pupal stage. Large numbers of these flies were seen on camels feeding on the exudation from the eyes, or from sores and lesions made by biting flies.

M. tempestiva, Fall., probably breeds in cow-dung. This species and *M. vitripennis,* Meig., are often seen on horses and cattle following the biting flies to feed on the exuded blood. Other species recorded include :—*Philaematomyia crassirostris,* Stein (*insignis,* Aust.) ; *Stomoxys calcitrans,* L. ; *Lyperosia exigua,* de Meij. ; *L. minuta,* Bez. ; *Calliphora erythrocephala,* Macq. ; *Chrysomyia* (*Pycnosoma*) *albiceps,* Wied. ; *Lucilia sericata,* Meig. ; *Sarcophaga haemorrhoidalis,* F., and *Wohlfahrtia meigeni,* Schin.

The destruction of breeding places and extermination of flies as accomplished at a camp in Mesopotamia are described. All refuse was burnt, for which purpose closed incinerators are recommended. All antiseptics such as borax, cresol, ferrous and ferric salts, etc., when applied to the manure retard fermentation and thus prolong the period for oviposition. As a result of experiments the biothermic method of dealing with large quantities of equine manure is advocated for use in the tropics. Anti-fly measures should be taken within five days of removal of the manure from the stable, preferably on the second or third day in the tropics. A shallow trench about 6 inches wide and 4 inches deep with straight, steep sides was constructed to encircle each mound of manure to trap the larvae that try to leave it. For the destruction of adults, properly constructed, baited traps are advocated. They may also be destroyed by means of burning torches when they collect on the roof and walls of sheds at night. The construction of such sheds and of bait traps is described and illustrated. The principle of the bait trap is to attract the flies by means of food, and to induce them to oviposit in the trap. For this purpose the green, partially digested contents of the stomachs and intestines of recently slaughtered cattle proved the most attractive bait. The trap is baited in the early morning, clots of fresh blood being placed on the top of the bait. At dusk the tray is removed and the bait containing large numbers of eggs is placed in the incinerator. The adults soon die after oviposition, and may be swept up at the bottom of the trap once or twice a week.

LISTON (W. G.). **The Use of Hydrocyanic Acid Gas for Fumigation.**—*Indian Jl. Med. Res., Calcutta,* vii, no. 4, April 1920, pp. 778–802, 5 plates, 4 figs. [Received 7th November 1920.]

The observations made by previous authors in the use of hydrocyanic acid fumigation are reviewed. The results of these show that this gas may be safely used if generated in a machine placed in the open air. Since an experimental machine was demonstrated at a Conference in Lucknow [*R.A.E.*, B., ii, 196] many similar machines have been in use for the fumigation of infested houses in Bombay and Poona. The advantages and disadvantages of various methods of fumigation are discussed ; and the plant erected at the Alexandra Docks, Bombay, for the treatment of soldiers' clothing and kit is described and illustrated. Experiments show that an exposure for two hours to a concentration of hydrocyanic acid gas starting with 100 parts in 100,000 and falling gradually to 30 parts per 100,000 was sufficient to kill bugs, fleas, lice and their eggs.

BOYD (J. E. M.). **The Value of Small Fish regarding the Destruction of Mosquito Larvae.**—*Jl. R.A.M.C., London,* xxxv, no. 5, November 1920, pp. 406–409.

Fish, especially surface feeders such as minnows and sticklebacks, destroy a considerable number of mosquito larvae, particularly in dykes and places where the latter are not protected by weeds. In recent observations on the intestinal contents of *Gasterosteus pungitius*, as many as seven larvae, probably of *Anopheles maculipennis*, were found in one individual, the average number being two.

PICCININNI (F.). **I Veicoli d'Importazione del Contagio della Peste in Italia e i Mezzi di Difesa.** [The Carriers involved in the Importation of Plague into Italy and Methods of Defence.]—*Ann. d'Igiene, Rome,* xxx, no. 10, October 1920, pp. 604–613.

Plague is brought to Italy by sea. Of the carriers involved man is the least dangerous, fleas are of very slight importance, and merchandise is also negligible except as a harbourer of the bodies of rats that have died of plague. Rats are by far the most important carriers. The methods of disinfection usually practised against these rodents leave very much to be desired. It has been found that to exterminate rats entirely on a wooden ship at Naples no less than three fumigations on three consecutive days are necessary.

The measures needed include careful daily examination of all parts of vessels and docks, sustained and intense rat-extermination work, and the adoption in all harbours open to international traffic of a separate sewer system entirely distinct from the municipal sewers [*R.A.E.*, B, viii, 202].

SCOTT (J. W.) & O'ROKE (E. C.). *Sarcocystis tenella.* **The Muscle Parasite of the Sheep.**—*Wyoming Agric. Expt. Sta., Laramie,* Bull. 124, June 1920, pp. 69–94. [Received 11th November 1920.]

The results of a large number of experiments with lambs, here described, indicate that infection with *Sarcocystis tenella* takes place independently of the presence or absence of insects, and the feeding of lambs with hundreds of the particular insects that appeared to be the only possible carriers of the infection gave negative results. The theory of an infective intestinal stage seems the most probable, infection resulting when sheep eat food contaminated with infective faeces of other sheep.

SCOTT (J. W.). **Parasitology Department.**—*29th Ann. Rept. Wyoming Agric. Expt. Sta., 1918–1919, Laramie,* 1920, pp. 154–157. [Received 11th November 1920.]

The most serious parasites of the horse noted were bots, lice, and the usual biting flies. *Gastrophilus intestinalis* (common bot fly) was frequently encountered, but *G. haemorrhoidalis* was reported only from the northern part of Wyoming. Swamp fever has not been prevalent.

Of sheep parasites one of the most serious is the Hippoboscid fly, *Melophagus ovinus* (sheep tick), which probably costs the State £40,000 annually for dipping alone. Several other common pests, such as mites and lice of poultry, lice on horses and cattle, mosquitos and biting flies, were present in their customary frequency.

Among human beings fewer deaths have occurred from Rocky Mountain spotted fever than in former years. The disease is possibly becoming less virulent, though it may be that better knowledge of it has resulted in greater precautions being taken against ticks.

HASE (A.). **Neue Beobachtungen und Versuche über die Lebensfähigkeit der Kleiderläuse und ihre Eier.** [New Observations and Experiments on the Viability of Clothes Lice and their Eggs.] —*Centralbl. Bakt., Parasit. u. Infektionskr., Jena,* Ite Abt., Orig., lxxxii, no 6, 28th February 1919, pp. 461–468. [Received 17th November 1920.]

These results relating to *Pediculus humanus* (*vestimenti*) are published in the hope of prompting the publication of any divergent findings, in view of the necessity for an accurate knowledge of the life-histories of lice.

The maximum period during which *P. humanus* resisted starvation was 7 days at summer temperatures, 10°–37° C. (50°–99° F.), and

10 days at winter temperatures, 0°–10° C. (32°–50° F.). As it is not always possible to distinguish strictly between these seasonal temperatures, the maximum period of 10 days must be used in practice. The female may be considered capable of oviposition at a temperature as low as 15° C. (59° F.), indicating that at winter temperatures oviposition ceases, though the lice are able to live longer, whereas they die quicker at summer temperatures, but are able to breed. It may lead to error if temperatures are considered when calculating the number of days during which a starving female is able to oviposit, and for this reason the time was taken after which no eggs are laid, even at favourable temperatures. This time is 5 full days without any food. Eggs do not hatch at a constant low temperature of 20° C. (68° F.) ; at a constant temperature of 25° C. (77° F.) incubation requires 16 days. At a constant temperature below the requisite minimum, development ceases and hatching is delayed. In his experiments the author was able to delay hatching for 11 days by a daily change from a warm to a cool temperature, the latter varying from 10°–12° C. (50°–54° F.), a condition quite common at night and represented in practice by the laying aside of infested clothing at that time. In another experiment the daily change of temperature was replaced by an alternation of a series of warm and cold days, and it was found that the eggs resist without injury a series of 5 successive cold days at any point of their developmental period. A test was made to ascertain how long newly hatched larvae can resist starvation, and this period was found to be 5 days at a room temperature of 15°–20° C. (59°–68° F.) ; at 10°–12° C. (50°–54° F.) this was prolonged to 7 days.

The above results lead to the conclusion that a period of 39 days (5+16+11+7) is necessary in practice if the starvation method of killing lice is to be depended upon in order to render clothes, household and other articles free from them.

WERNER (H.). **Zur Aetiologie der Febris quintana.** [On the Aetiology of Five-Day Fever.]—*Centralbl. Bakt., Parasit. u. Infektionskr., Jena,* Ite Abt., Orig., lxxxii, no. 7, 25th March 1919, pp. 571–576, 2 figs. [Received 17th November 1920.]

The transmission of five-day fever from man to man may occur through infected blood or through the bites of lice. This proves that the virus circulates in the blood and is taken up by the louse. It is not certain whether development occurs in the louse or whether transmission is purely mechanical ; the latter is probable. As regards the various supposed causal agents, it is not improbable that *Rickettsia* is connected with the disease, but this is uncertain.

PRELL (H.). **Ueber eine enzystierte Fliegenlarve aus der Leibeshöhle des Grasfrosches.** [An encysted Fly Larva from the Body-Cavity of the Grass Frog.]—*Centralbl. Bakt., Parasit. u. Infektionskr., Jena,* Ite Abt., Orig., lxxxiii, no. 7, 31st October 1919, pp. 541–549, 5 figs. [Received 17th November 1920.]

Details are given regarding the presence of a fly maggot in a cyst in a grass frog captured near Stuttgart, though this parasitism is believed to be quite accidental.

ECKSTEIN (F.). **Zur Systematik der einheimischen Stechmücken. 3. Vorläufige Mitteilung : Die Männchen.** [A Contribution to the Systematic Study of Mosquitos native to Germany. Third Preliminary Communication : The Males.]—*Centralbl. Bakt., Parasit. u. Infektionskr., Jena,* Ite Abt., Orig., lxxxiv, no. 3, 15th March 1920, pp. 223-240, 23 figs. [Received 17th November 1920.]

This is the last of three preliminary papers on German mosquitos [*R.A.E.*, B, vii, 69, 173]. Generic and specific keys, based on the male genital characters, are given together with brief notes on the 18 species concerned.

BAU (A.). **Die Elchrachenbremse,** *Cephenomyia ulrichi,* **Brauer, und ihre Larvenstadien.** [The Elk Throat Bot-Fly, *Cephenomyia ulrichi,* Brauer, and its Larval Stages.]—*Centralbl. Bakt., Parasit. u. Infektionskr., Jena,* Ite Abt., Orig., lxxxiv, no. 7-8, 14th August 1920, pp. 541-554, 2 plates. [Received 17th November 1920.]

A detailed description is given of the various larval stages of the Oestrid, *Cephenomyia ulrichi,* Brauer, infesting the nose and throat cavities of the elk.

It is not possible to compile an accurate key to the third-stage larvae of these flies, but the author gives, with some alterations, Bergman's key to those of *C. stimulator,* Clark, *C. rufibarbis,* Mg., *C. ulrichi,* Br., and *C. trompe,* L. Brauer's key to the adults of these four species is also quoted.

PARACAMPO (A.). **Hygiene nos Campos.** [Rural Hygiene.]—*Brasil Agricola, Rio de Janeiro,* v, nos. 7 & 8, July & August 1920, pp. 212-214, 236-242, 10 figs. [Received 17th November 1920.]

This is a popular article, a section of which deals with malaria and its Anopheline transmitters and also with Chagas' disease, of which *Triatoma megista* is the vector. Illustrations are given of all stages of this bug and of the typical thatched mud cabin in which it abounds. The chief prophylactic measure advocated is the construction of well-lit, airy dwellings of which the walls have a surface that is quite smooth and without cracks. The introduction of these and other sanitary measures has caused this disease to disappear entirely from Bello Horizonte, which is now one of the healthiest towns in Brazil.

FAHRENHOLZ (H.). **Anopluren des Zoologischen Museums zu Hamburg. (3. Beitrag zur Kenntnis der Anopluren.)** [Anoplura of the Zoological Museum at Hamburg. Third Contribution to the Knowledge of Anoplura.]—*Mitt. Zool. Mus. Hamburg,* xxxiv (1916), 1917, pp. 1-22, 5 figs.

Most of the Anoplura of the Hamburg Museum have been worked out by Mjöberg, but the following additional species are described :—*Pediculus humanus chinensis,* subsp. n., probably from Chinese ; *Pedicinus paralleliceps colobi,* subsp. n. ; *Haematopinus suis chinensis,* subsp. n. ; *H. suis germanicus,* subsp. n., from *Sus scrofa domesticus* ; *H. minor,* sp. n., from *Equus burchelli* ; *Linognathus coassus,* sp. n., from a deer, *Coassus* sp. ; and *L. gilvus,* sp. n., from a duyker, *Cephalophus* sp.

PIOT BEY (J. B.). **Organisation et Fonctionnement du Service Vétérinaire à l'Administration des Domaines.**—*Mem. Inst. Egypte, Cairo,* ii, 1920, pp. 1–98, 2 charts.

The work of the above-mentioned veterinary service, from its inauguration about 1879 up to 1917, is here reviewed.

This report also gives a résumé of the more important diseases of stock and their treatment and prevention in Egypt and Northern Africa.

GRESCHIK (E.). *Ixodes ricinus* **schmarotzt im Larvenstadium auch an** *Sylvia atricapilla.* [The Larva of *I. ricinus* also a Parasite of *S. atricapilla.*]—*Aquila, Budapest,* xxvi (1919), 1920, p. 146.

In 1919 the author found the larvae of *Ixodes ricinus* on newly hatched nestlings of *Sylvia atricapilla.* The birds were infested on the head.

MARTINI (E.). **Macedonische Culicinae.** [Macedonian Culicinae.]—*Zeitschr. wiss. Insektenbiol., Berlin,* xv, no. 4–6, 15th December 1919, pp. 119–120. [Received 20th November 1920.]

As a result of an examination of the literature published during the War, the author finds that some mosquitos observed by him in Macedonia have not been mentioned, and for this reason the following full list is given :—*Anopheles bifurcatus,* L. ; *A. maculipennis,* Mg., *A. plumbeus,* Hal. (*nigripes,* Staeg.) ; *A. palestinensis,* Theo. ; *A. hyrcanus,* Pall. (*sinensis,* Wied.) ; *Uranotaenia unguiculata,* Edw. ; *Culex pipiens,* L. ; *C. hortensis,* Fic. ; *C. mimeticus,* Noé ; *Theobaldia annulata,* Schr. ; *T. longiareolata,* Macq. ; *Taeniorhynchus richiardii,* Fic. ; *Aëdes* (*Ochlerotatus*) *dorsalis,* Mg. ; *A. vexans,* Mg. ; *A. nemorosus,* Mg. ; and *A. ornatus,* Mg.

Few observations were made north of Uskub.

ENGEL (E. O.). **Dipteren, die nicht Pupiparen sind, als Vogelparasiten.** [Non-pupiparous Diptera as Bird-Parasites.]—*Zeitschr. wiss. Insektenbiol., Berlin,* xv, no. 10–12, 1st August 1920, pp. 249–258, 9 figs.

The Diptera the larvae of which actually parasitise birds, are not very numerous, most of them being Muscids.

Of the flies the adults of which are parasitic, only two species, both of the same genus, have been hitherto recorded from Central Europe. Of these, *Carnus hemapterus,* Nitzsch, has been taken from *Sturnus vulgaris, Falco tinnunculus, F. sacer, Aquila imperialis, Silvia atricapilla,* and *Jynx torquilla.* The second species is *C. setosus,* Stobbe.

Little is known of the biology of the Dryomyzid, *Neottiophilum praeustum,* Mg., but it is probably parasitic in the larval stage. Another parasitic larva is that of *Mydaea pici,* Macq.

Protocalliphora sordida, Ztt., was reared from pupae taken from a titmouse's nest. As the young birds had left it was evident that infestation by the larvae is not always fatal. *P. azurea,* Fall., was obtained from nests of *Riparia riparia.* Notes on the imaginal and larval differences between these two species of *Protocalliphora* are given. The author regards this genus as a subgenus of *Phormia,* R.D., and gives a key to the following species : *Phormia regina,* Mg. ; *P. groenlandica,* Ztt. ; *Protocalliphora sordida,* Ztt. ; *P. azurea,* Fall. Notes on the synonymy are also given.

Larrousse (F.). **Nouvelle Espèce américaine du Genre** *Phlebotomus, Phlebotomus brumpti,* **sp. nov.**—*Bull. Soc. Path. Exot., Paris,* xiii, no 8, October 1920, pp. 659–662, 3 figs.

Phlebotomus brumpti, sp. n., here described, was taken in May in the State of San Paulo, Brazil. This species is said to bite man all the year round except on very cold nights.

Noc (F.). **Les Spirochétoses humaines à Dakar (Sénégal).**—*Bull. Soc. Path. Exot., Paris,* xiii, no. 8, October 1920, pp. 672–679.

In August 1919 investigations were begun at Senegal to ascertain the possible existence and normal conditions of development of certain spirochaetes. In the absence of yellow fever cases an examination was made of native children and animals for the presence of *Leptospira icteroides,* but only one young cat was found to harbour extremely small spirochaetes in the kidney tissue. The pathogenicity of this organism in relation to man has not yet been proved. The mosquitos *Culex fatigans, Anopheles* (*Myzomyia*) *funestus* and *Stegomyia fasciata* (*calopus*) were also examined, and only in the latter species were small organisms that morphologically resemble *L. icteroides* found in the Malpighian tubes. These organisms were, however, not sufficiently numerous to warrant evidence of virus conservation in mosquitos in the absence of direct infection from man. The sole transmitter of yellow fever is *S. fasciata* directly infected from man within the first three days of illness.

The causal agent of spirochaetal jaundice [*Spirochaeta icterohaemorrhagiae*] has been isolated in Dakar from November to April from various species of rats. The virus, however, is widely distributed, and may prove to be more abundant in the hot and rainy season. It still remains to be determined whether this organism is distinct from that causing yellow fever in man ; also whether it is the sole cause of the lesions produced. It is possible that the virus transmitted by *Stegomyia* is obtained from rodents, but further observations are necessary on this point, as well as to determine whether the character of this organism is of a specific nature or only the result of adaptation in the invertebrate host.

Blackwater fever has not yet been determined to be of definite spirochaetal origin. At Dakar its relative frequency during the cold season has been found to be in direct relation to the reappearance of Anophelines in localities where the disease occurred amongst Europeans. Numerous spirochaetes were found in a liver scraping taken from a patient after death, but there is no evidence of these being the cause of the disease.

Spirochaetes resembling those of recurrent fever are recorded, apparently for the first time, in man at Dakar. Similar organisms have already been found in a shrew, and proved pathogenic to monkeys. Further investigations on this subject are desirable.

França (C.) & Parrot (L.). **Introduction à l'Étude systématique des Diptères du Genre** *Phlebotomus.*—*Bull. Soc. Path. Exot., Paris,* xiii, no. 8, October 1920, pp. 695–708, 4 figs.

The need for systematic work on the genus *Phlebotomus* is of enhanced urgency in view of the fact that these Diptera are known to transmit sandfly fever and are suspected of transmitting Oriental sore and verruga.

Except for the work of Newstead, who alone up to the present has successfully applied precise methods to the identification of *Phlebotomus* [*R.A.E.*, B. iii, 11 ; v, 5, etc.], the descriptive bibliography of this genus is in a chaotic condition.

This paper is an attempt to establish, in accordance with Newstead's and the authors' own researches, the general rules that should govern the identification and description of the various species ; it also aims at revising a number of imperfectly known species.

A description of the genus is given and its characters are discussed. Differences in the male genital armature caused the senior author to propose two subgenera, *Phlebotomus s. str.*, which includes *P. papatasii* and its allied species or varieties, *P. roubaudi* and *P. duboscqui*, and *Newsteadia*, in which all the other known species should be placed. As *Newsteadia* is preöccupied as a generic name it is here replaced by *Sergentomyia*. The characters differentiating these two subgenera are given, and as there is between them a category for transitional forms—in which *P. malabaricus*, Annandale, may perhaps be placed—this third category would form a third subgenus, *Neophlebotomus*.

The terminology to be used and the points to be noted when preparing specific descriptions are dealt with in detail. It is advised that females be described from paired specimens only, unless the characters are quite distinctive or the species is determined with certainty.

CARPENTER (G. H.) & HEWITT (J. O'N.). **The Warble Flies : Fifth Report on Experiments and Observations as to Life-history and Treatment.**—*Jl. Dept. Agric. Tech. Instruct. Ireland, Dublin*, xx, no. 4, 1920, pp. 452–459, 3 diagrams, 1 map.

The attempt to clear Mason Island of warble flies as mentioned in the fourth report of this series [*R.A.E.*, B, iii, 22] was given up, as it was found that a large proportion of the islanders' cattle was transported to the mainland during the summer, and the animals were thus necessarily subjected to the attack of the flies.

Clare Island, Co. Mayo, three miles from the nearest point of the mainland, was then selected, and a systematic destruction of larvae on all the cattle (by squeezing out and destroying the maggots) was begun early in 1915 and has been carried on each year since. In 1915 over 6,000 maggots were found ; by 1920 they had been exterminated. The time taken was longer than had been expected, but in a locality where the conditions were easier, success might probably be attained after two years' work.

Both *Hypoderma bovis* and *H. lineatum* were found on the island, and the statements previously published that calves and yearlings are more heavily infested than older cattle, are strongly confirmed. An important fact in the life-history of these flies brought out by these investigations is that the period of emergence of mature maggots extends to midsummer or later. It is therefore necessary to examine all cattle every three weeks from January to July inclusive. Inspection of imported cattle shows that continual watchfulness will be necessary if the pest is to be kept out of the island in future, but the population is fully alive to the benefits derived from the absence of the flies.

FERMI (C.). **Sugli Anofeli e sulla Malaria in Relazione ai Risanamenti antianofelo-malarici. Note sintetiche preliminari.** [Anophelines and Malaria in Relation to Anti-anopheline and Anti-malaria Sanitation Work. Preliminary Synthetic Notes.]—157 pp. [Supplement to *Ann. d'Igiene, Rome*, xxx, 1920.]

The study of Anopheline mosquitos is steadily becoming more and more important and requires intensified attention while the present large-scale experiments in anti-mosquito work are in progress, and state-conducted anti-mosquito and anti-malaria organisation is imminent. This interesting paper aims at summarising results obtained in Italy, of which a full account is to be published later. It deals with the morphology and biology of Anophelines and Culicines in general, observations on the *Anopheles*-malaria theory, researches on the early and adult stages of Anophelines and measures against them. The subject-matter is divided into 130 sections each of which briefly covers a given point, and the mass of condensed information it contains cannot be done justice to in an abstract.

SOUTHWELL (T.). **Fish and Mosquito Larvae in Bengal, Bihar and Orissa, India.**—*Ann. Trop. Med. & Parasit., Liverpool*, xiv, no. 2, 27th November 1920, pp. 181–186.

The most important larvicidal fish that occur in fresh water in India are *Haplochilus panchax, H. melastigma* and *H. lineolatus*; there are also many species of minor importance, such as *Ambassis nama, A. ranga, Badis badis, Barbus* spp., *Anabas scandens* and several others.

In any attempt to use fish against mosquito larvae, there are a few points that have to be considered. It is impossible to keep ponds or large areas of water stocked with larvae-destroying fish, because they are themselves devoured by larger predatory fish. Consequently the utility of fish for destroying mosquito larvae is very limited. There is, however, no doubt that some slight improvement would result if more care was taken to stop the introduction of predatory species into ponds. This could be effected by stocking with pure fry only, instead of with mixed species. Carp are not predatory, and so may be cultivated along with larvicidal fish.

Oiling tends to kill small fish, and as it renders the water objectionable for domestic purposes, this means of mosquito control is not considered desirable by village populations.

BLACKLOCK (B.) & CARTER (H. F.). **Further Experiments with** ***Anopheles plumbeus*, Stephens; its Infection with** ***P. falciparum*** **in England; also Notes on the Apparatus and Technique employed.**—*Ann. Trop. Med. & Parasit., Liverpool*, xiv, no. 2, 27th November 1920, pp. 275–282, 1 plate.

In these experiments, of twelve females of *Anopheles plumbeus* fed once on one or other of two cases of simple tertian malaria (*Plasmodium vivax*), and subsequently kept at room temperature varying from a maximum of 22° C. (71° F.) to a minimum of 13° C. (55° F.), none became infected.

Of twelve females of *A. plumbeus* fed once on a case of malignant tertian malaria (*P. praecox* (*falciparum*)) and subsequently kept at 28° C. (82° F.), none lived longer than eight days after the infected feed; one contained oöcysts in the mid-gut.

A description of the methods and apparatus used during these experiments is given, as the technique has been considerably improved upon since those recently described [*R.A.E.*, B, viii, 96].

Symposium on the Progress in Mosquito Work.—*Proc. Fifth Ann. Meeting, New Jersey Mosquito Extermination Assoc., Trenton,* 1918, 116 pp. 1 plate. [Received 2nd December 1920.]

This includes a number of reports from various counties of New Jersey detailing the particular remedial measures suitable to the locality that have been carried out. It is estimated by R. F. Engle that 9,000 acres can be added to the area of drained marshland, which already comprised 95,000 acres in 1917, the drained areas remaining free from infestation. The latest mechanical devices and ditching machines are described by H. I. Eaton. Thoroughness in ditching and draining operations are considered the most essential factors in mosquito eradication by E. Winship, who describes the drainage operations in Greater New York. The necessity for organising a proper patrolling force is emphasised.

YOUNG (D.). **The Problem of Water Pollution in Relation to Mosquito Control.**—*Proc. Fifth Ann. Meeting, New Jersey Mosquito Extermination Assoc., Trenton,* 1918, pp. 35–42. [Received 2nd December 1920.]

The purification of rivers and streams after years of gross pollution, which has encouraged intensive mosquito breeding, is a difficult problem, and is likely to require far more expenditure than the public is prepared for. Frequently the discharge of sewage and manufacturing waste-products into ponds, pools and streams, while increasing mosquito breeding, has destroyed fish and other natural enemies. In studying the question of purification it is necessary to determine the origin, character and quantity of the pollution. The only existing method of mosquito destruction in polluted waters is oil spraying, and this is a temporary expedient, limited in its effect on large areas, only minimum results being obtained from maximum effort. There are also many specific problems dependent upon the kind and condition of the polluting material present. For example, the discharge from tanneries of tannic acid, lime and clay waste causes discoloration and affects fish life. The spent lye discharged from soap works, and nitric and sulphuric acid from ammunition and powder factories, destroy all insect life and fish. Sewage-polluted streams, and even salt water, seem to have a particular attraction for the female of *Culex pipiens*, while they preclude the presence of the killifish that are natural enemies of mosquitos. In water polluted with commercial waste both *C. pipiens* and [*Aëdes*] *sylvestris* have been found breeding prolifically, the only remedies being frequent trimmings of the banks of open sewers and the liberal use of crude oil. Sewage-polluted meadow pools are more troublesome than fresh or salt water, for *C. pipiens* appears in these much sooner after oil treatment than in fresh or salt water pools.

It is suggested that part of the responsibility for river and stream pollution rests with health officers, who frequently fail to enforce the Board of Health ordinances and the State Sanitary Code enactments.

The discovery of a larvicide of such a chemical character that it would be harmless to plant life and to domestic animals and would remain effective during the season, would be of the greatest advantage.

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Carter (H. F.), Ingram (A.) & Macfie (J. W. S.). **Observations on the Ceratopogonine Midges of the Gold Coast with Descriptions of New Species.**—*Ann. Trop. Med. & Parasit., Liverpool,* xiv, no. 2, 27th November 1920, pp. 187–274, 27 figs., 5 plates.

Small biting midges, colloquially called "sand-flies," are abundant in the Gold Coast, and in many parts of the country are very troublesome. The first part of this paper describes observations on them carried on from December 1919 to May 1920. In the second part, an account, to be continued in subsequent papers, is given of the species obtained, particularly those referable to the genera *Culicoides, Dasyhelea* and *Forcipomyia.*

The methods of collecting, preserving and examining specimens are described in detail. The midges are highly phototropic, as are also the larvae to a certain extent. The adults collect in large numbers on the inside of windows at dusk, where they are frequently attacked by predaceous insects and small lizards. Of the former, a small Empid, *Elaphropeza* sp., was observed to carry off a *Culicoides,* and also preys upon *Forcipomyia ingrami,* Cart., and other species of this genus. At the same time examples of *Phlebotomus* (probably *P. minutus* var. *africanus*) were repeatedly seen, engorged with blood, clinging tenaciously to the lizards. The authors, who spent a considerable time collecting on these occasions, were never conscious of being bitten by any insects other than mosquitos, but it may be mentioned that the one who made most of the collections suffered from nine separate short attacks (one to seven days) of fever during the period, and that on none of these occasions were malaria parasites found in his blood.

The breeding places of these midges are indicated under the various species. Large numbers often emerge from small quantities of material. The larvae of *Culicoides* are very active; they normally develop in water, but appear to be capable of surviving for several days in moist situations where no water is present. The duration of the larval stage is probably largely influenced by the food-supply, and may certainly extend over several weeks. The pupae float on the surface, and are rather sluggish, though more active than those of *Forcipomyia ingrami* [*R.A.E.*, B, vii, 81]. They are easily killed, and cannot survive submergence for any length of time, but will live out of the water, if they are kept moist and can get air. The pupal stage lasts three to five days [see also *R.A.E.*, B, viii, 212].

In the case of *Dasyhelea,* the larvae, though requiring moisture for their development, are not truly aquatic, and are unable to survive submersion in water. Their natural habitat appears to be the interstices between the fibres of vegetable matter, preferably when rotting. They are relatively sluggish, and when placed in water, crawl about laboriously at the bottom. They crawl rather more rapidly over solid materials such as banana fibre, and quickly bury themselves in them. They were never found on the surface of the materials they lived in. They can climb a few inches up the sides of a glass jar. The duration of the larval stage appeared to be long (several weeks), and is probably largely dependent on food-supply and temperature. Pupation takes place close to the surface of the material in which the larvae developed, the respiratory siphons and a little of the cephalo-thorax only protruding. The pupae are very sluggish, and do not survive long in water. The duration of the pupal stage is three or four days.

The second part of this paper relates to the classification of the Ceratopogoninae. Besides descriptions of the species, an account is given of the external morphology of the various stages of the genus, summarising the characters common to all the species that were examined.

Culicoides inornatipennis, sp. n., was reared from materials taken from a rot-hole in the stump of a silk-cotton tree (*Eriodendron anfractuosum*) together with other species, and from rotting materials taken from the base of a banana plant, associated with several species of *Dasyhelea*. *C. schultzei*, End., was numerous on windows, while larvae and pupae were found in puddles, in a backwater of a river, and in rotting wood taken from canoes. *C. punctithorax*, sp. n., was reared from the rot-hole mentioned above. *C. accraensis*, sp. n., was taken on windows, and its larvae were found in rot-holes in flamboyant (*Poinciana regia*), silk-cotton (*E. anfractuosum*), cashew (*Anacardium occidentale*), *Cynometra* sp., and other trees. *C. clarkei*, sp. n., was reared from materials obtained from rot-holes in stumps of *E. anfractuosum, Cynometra* sp. and another tree ; and *C. confusus*, sp. n., from similar material from *E. anfractuosum*. *C. eriodendroni* was bred from rot-holes in the stumps of *E. anfractuosum, Mangifera* sp. (mango) and another tree ; *C. nigripennis* from pupae in débris from a rot-hole in mango ; and *C. similis* from material taken from a canoe.

C. fulvithorax, Aust., *C. distinctipennis*, Aust., *C. praetermissus*, sp. n., *C. neavei*, Aust., *C. citroneus*, sp. n., *C. austeni*, sp. n., *C. grahami*, Aust., and *C. pallidipennis*, sp. n., were all collected as adults, chiefly on windows in the evening.

Keys are given to both sexes of the species of *Culicoides* now known to occur in the Gold Coast.

HEADLEE (T. J.). **Migration as a Factor in Control.**—*Proc. Fifth Ann. Meeting, New Jersey Mosquito Extermination Assoc., Trenton*, 1918, pp. 104–112. [Received 2nd December 1920.]

The evidence of mosquito flight is discussed, and many records of previous authors are quoted. The cause of mosquito migrations is obscure, but doubtless bears some relation to the necessities of food and reproduction. The female usually alternates between places where food occurs and where eggs may be laid. This is the type of movement exhibited by the mosquitos that breed about human habitations ; when, however, the same species breeds very densely over a large area, it may migrate for as far as 2½ miles. In the case of species that live in the wilds such as the malaria-carrying *Anopheles*, a distance of half a mile or so may be covered in search of food, the return flight being made before morning [*R.A.E.*, B, iv, 97–99].

The fresh water swamp mosquitos such as *Aëdes sylvestris*, when in small numbers, seem to have the same movement as the house mosquitos, such as *Culex pipiens*, but when breeding in great numbers over a large area, may cover long distances in search of food, frequently starting a fresh breeding-place in the food locality. A small brood of the salt marsh mosquitos, *A. cantator* and *A. sollicitans*, will travel only a short distance for food and return to the marsh for oviposition, but a large one will throw off a number of migrants that will fly for long distances over territory in which there is no suitable breeding-ground. Intense breeding over large areas is followed by a wide distribution of *Culex pipiens, Aëdes sylvestris, A. cantator*, and *A. sollicitans*. It is possible that under similar conditions some malaria-carrying Anophelines will be found to behave in the same way. External factors, such as low temperatures, light, atmospheric moisture and air movements, have a marked influence upon mosquito activity, especially in long-distance flights. Ordinarily these take place with a slow-moving, warm, damp wind, but modifications in direction of flight may be due to mountain ridges and possibly other unknown factors.

Flight, therefore, may seriously interfere with projects for keeping a specified locality free from mosquitos, and plans and estimates for eradication measures must be based on a study of the mosquito breeding places within a specified area and must include an analysis of mosquitos on the wing throughout that locality for at least one summer season. A thorough knowledge of adult mosquitos will also enable a distinction to be made between local breeding and invasions, and the latter should be traced and the sources eliminated.

Symposium on Mosquito Control.—*Proc. Sixth Ann. Meeting, New Jersey Mosquito Extermination Assoc., Trenton,* 1919, pp. 19–55. [Received 2nd December 1920.]

The records of mosquito work during 1919 in the various counties of New Jersey are almost entirely concerned with the acreage of salt marsh that has been drained in each mosquito-infested locality. In the inland counties, where the salt marsh mosquito problem does not exist, infestation of fresh water occurs in scattered localities, and there is not much attempt at co-operation in dealing with them.

HEADLEE (T. J.). **Summary of the State and County Work.**—*Proc. Seventh Ann. Meeting, New Jersey Mosquito Extermination Assoc., Trenton,* 1920, pp. 69–75. [Received 2nd December 1920.]

In summarising the reports of the State and county workers on mosquito problems, the author remarks that during seven years' experience in anti-mosquito measures he has found no more efficient organisation than that now existing in New Jersey. The point of difference from other large organisations is the part played by local units, the working of which is described. Eleven counties are now actively employed in anti-mosquito work, while ten are more or less inactive. The expenses incurred and the work done are briefly reviewed. Inspection or patrol work was carried out over some 320,000 acres of upland and about 115,000 acres of salt-marsh. Oil was used as a supplementary measure, and about 5,000 acres of salt-marsh and a very large acreage of upland marsh were drained. The towns and villages within the protected area suffered very little from mosquito invasion, while many of those outside were heavily infested. In most of the counties where drainage has been done not a single brood of salt-marsh mosquitos appeared.

The problem of securing larvicides for future work is becoming acute, and further experimental work must be done with the object of developing a larvicide to take the place of oil. The constant changing of the relative importance of various species of mosquitos indicates that their biology is not sufficiently understood. It is possible also that an investigation of the agencies attracting the mosquito to man might reveal other methods of attacking the problem.

HOWARD (L. O.). **Efforts at Mosquito Control in Different Parts of the World.**—*Proc. Seventh Ann. Meeting, New Jersey Mosquito Extermination Assoc., Trenton,* 1920, pp. 16–28. [Received 2nd December 1920.]

The literature that has been published and the chief lines of work in mosquito extermination that have been carried on in all parts of the world since the first general convention to consider the question was held in New York City sixteen years ago, are reviewed. The United States has advanced further in the campaign than any other country, owing perhaps in large measure to the motive of personal comfort With the outbreak of the war, however, malaria control became a world-wide problem. New Jersey is conducting the mosquito campaign on a larger and more resourceful scale than any other region, and the results have been surprising. It is especially noteworthy that this success has been obtained under expert entomological advice, and the necessity is urged for exact knowledge of local species and their habits and for trained entomologists to investigate the biology and taxonomy of the hundred or more species of mosquitos in North America.

WINSHIP (E.). **Methods and Results of Mosquito Work in New York City.**—*Proc. Seventh Ann. Meeting, New Jersey Mosquito Extermination Assoc., Trenton,* 1920, pp. 105–110. [Received 2nd December 1920.]

The year 1919 was a very unfavourable one as regards anti-mosquito measures in Greater New York. Continual heavy rainfalls during the summer months encouraged innumerable breeding-places, and mosquitos appeared in localities previously free from them. In spite of this the anti-mosquito campaign has been a most successful one, while the drained areas formerly constituting salt-marshes have been free from infestation. The ditching system in use is described, and is considered the cheapest method of exterminating mosquitos. Some 5,000 gallons of oil were used on the inland swamps, ponds and pools of New York during 1919, and it is considered that the value of these measures is enormous compared with the cost.

HOWARD (L. O.). **Swarming of** *Anopheles.*—*Science, Philadelphia, Pa.,* lii, no. 1350, 12th November 1920, pp. 468–469.

As a result of the statement that no previous mention has been made of the swarming of Anophelines [*R.A.E.*, B., viii, 94] attention is drawn to a paper by Knab (*Psyche,* February 1907) on the swarming of *Anopheles maculipennis,* Say, also quoted in the monograph of the mosquitos of North and Central America and the West Indies, with a number of similar observations by other authors.

CHEETHAM (C. A.). *Theobaldia arctica,* **Edw., in Yorkshire.**—*Naturalist, London,* no. 767, December 1920, p. 407.

Attention is drawn to the occurrence of *Theobaldia alaskaensis,* Ludl. (*arctica,* Edw.) in May 1919 in Yorkshire.

WILHELMI (J.). **Zur Ueberwinterung von Musciden.** [Notes on the Hibernation of Muscid Flies.]—*Zeitschr. angew. Entom., Berlin,* vi, no. 2, February 1920, pp. 296–301. [Received 2nd December 1920.]

A knowledge of the conditions under which flies hibernate is necessary if successful measures are to be taken against them. Up to the present little is known on this point.

As the results of experiments, *Pollenia rudis* appears to hibernate as an adult, which remains motionless. Nothing was learned regarding the pre-imaginal stages.

Musca domestica hibernates as a mobile adult, and probably in a pre-imaginal stage as well. The same applies to *Fannia canicularis* and *Stomoxys calcitrans.*

Lyperosia irritans probably hibernates in a pre-imaginal stage. Nothing is known about the adult stage in this connection.

Though the information obtained is scanty, it appears that each species is able to hibernate in different stages. Mobile and motionless imaginal hibernation does not, however, appear to occur in one and the same species.

ECKSTEIN (F.). **Aus einer Feldstation für Stechmücken.** [Notes from a Mosquito Field-station.]—*Zeitschr. angew. Entom., Berlin,* vi, no. 2, February 1920, pp. 338–371, 11 figs. [Received 2nd December 1920.]

These observations were made near Mannheim, at a bend of the Rhine, which at times floods portions of it.

The following mosquitos are found: Culicines: *Culex pipiens, C. hortensis* (*territans*), *Theobaldia* (*Culicella*) *morsitans, T.* (*Culiseta annulata, Taeniorhynchus* (*Mansonia*) *richiardii, Ochlerotatus maculatus* (*Culicada cantans*), *O.* (*C.*) *vexans, O. geniculatus* (*C. lateralis*), *O.* (*C.*) *annulipes, O.* (*C.*) *diversus, O.* (*C.*) *ornatus,* and *Aëdes cinereus.* Anophelines: *Anopheles maculipennis, A. bifurcatus,* and *A.* (*Coelodiazesis*) *plumbeus.*

O. maculatus is the commonest species, and with *O. vexans* is responsible for the plague of mosquitos at Mannheim. This is important, for spraying the breeding-places in spring will result in a notable decrease of the mosquitos in summer, because there is only one generation, derived from the eggs that have hibernated. It is of course necessary to spray repeatedly during the summer against the species that have several generations.

The principal object of the author's visit was to test the various repellents that have been recommended against mosquitos. It was found that a given repellent does not always act in the same way against different species. Under otherwise similar conditions the author was bitten more often when wearing dark colours than when wearing light ones. In no case did any of the 28 substances tried, or mixtures of them, prove of more than fugitive value. A powerful odour does not appear either to repel or attract mosquitos. For practical use the repellent should be harmless, colourless, odourless, capable of keeping mosquitos about 3 feet away, light in weight, cheap, and active for 6–7 hours. Experiments in fumigation showed that the mosquitos tend to become stupefied, but not killed. The palliatives advised by Ewing are good [*R.A.E.*, B, vii, 25], but ordinary 70 per cent. alcohol proved quite satisfactory.

In a 1 per cent. solution of sodium silicate mosquito larvae die after 20 hours, and pupae in 5. Nitre cake, consisting of anhydrous sodium sulphate and acid sodium sulphate [*R.A.E.*, B, vi, 137], is useless against *Culex pipiens* in Germany, for the larvae and pupae are not killed, nor is the hatching of the eggs prevented.

Anopheles maculipennis and *A. bifurcatus* are abundant. Some of the former (both larvae and adults) are infested with small red mites, without any apparent effect. In the aquarium the mites remained on the cast skins, thereby losing their hosts.

If larvae of different species are kept in an aquarium it will be seen that *Culex pipiens* and *A. maculipennis* usually remain at the surface ;

O. vexans remains below for longer periods; and *Aëdes cinereus* is more often found below than above. In the case of *A. maculipennis* this may be due to its long lateral bristles making swimming beneath the surface difficult. In the case of the three other species the oxygen content of the water may influence them. The functions of these bristles should be studied. Their removal renders swimming at the surface difficult, and causes severe injury, soon followed by death.

Aëdes cinereus is found in clean water only, *O. vexans* perhaps prefers dirty water and *Culex pipiens* occurs in very dirty puddles, rain-water casks, etc.

Anopheles plumbeus is the most interesting of the 3 German Anophelines from a biological point of view. In the forests it attacks man from 8 a.m. onwards in warm weather during July and August. Even in cool weather it bites in the mid-day hours. It never occurs in stables with *A. maculipennis* and *A. bifurcatus*, and is even more an out-door species than the latter. A captive female oviposited on wet blotting paper instead of on water, and died within 18 minutes of depositing the first egg. Probably, therefore, it oviposits on the edge of the breeding-place in tree-holes, the eggs hatching when heavy rain raises the water-level. It is probable that hibernation takes place at such places in the egg-stage.

Theobaldia morsitans is not known to bite in Germany, but appears to feed on avian blood. In the Mannheim woods when shelters for wild birds were examined, numerous gorged examples of *T. morsitans* were found, with a few *A. maculipennis* and *A. bifurcatus*, and two females of *Culex hortensis* (the other non-biting German species).

LUTRARIO (—). **Note sur l'Emploi de l'Acide cyanhydrique dans les Services de Prophylaxie.**—*Bull. Office Internat. d'Hyg. Publique, Paris*, xii, no. 5, May 1920, pp. 484–492, 1 plan, 1 chart.

In experiments with gaseous reagents chloropicrin and phosgene were found unsatisfactory. Chloropicrin is slow in action on rodents, 3 hours at 1·07 c.c. per cu. metre being necessary to kill them, fleas are not affected by it and a special generator is required. Phosgene at the rate of 1 gram of the liquid per cu. metre kills rats and fleas in about 1 hour, but in damp places this gas rapidly decomposes and loses all its efficiency; it has the further disadvantage of corroding metals.

With hydrocyanic acid gas 2½ grams of sodium cyanide per cu. metre of space are recommended; this will kill all rats and their fleas in 1 hr. 45 min. Thirty minutes ventilation should suffice after fumigation, but 1 hour is safer.

An indicator that will give a reaction in a dilution of 1 part of HCN in 3 million of air is prepared by dipping paper in a 3–4 per cent. solution of guiacum resin in alcohol. The paper is dried, and when required for use it is sensitised with a 1 per cent. solution of copper sulphate.

Apart from the cost of the Clayton apparatus necessary for fumigation with sulphurous anhydride, the cost of the hydrocyanic acid method is only about half as much.

An entirely successful result was obtained at Venice, where a grain elevator with a content of 350,000 cu. metres and containing 25,000 tons of grain was fumigated against rats and their fleas, sodium cyanide at the rate of 2½ grams per cu. metre being used. Double this strength was found efficient against all stages of *Pediculus humanus* (*vestimenti*), *Haematopinus suis* and bed-bugs, an exposure of 5 min. being given. This gas also gave good results in the disinfection of railway carriages.

LEGER (A.). **Le Paludisme à Dakar en Milieu indigène.**—*Bull. Soc. Méd. Chir. Française de l'Ouest-Africain*, i, June 1919, pp. 3–5. (Abstract in *Bull. Inst. Pasteur, Paris*, xviii, no. 7, 15th April 1920, pp. 253–254.)

Between 75 and 80 per cent. of the Anophelines captured in the town of Dakar were *Anopheles* (*Pyretophorus*) *costalis*. *A.* (*Myzomyia*) *funestus* and *A.* (*Cellia*) *pharoensis* also occurred.

BONNE-WEPSTER (J.) & BONNE (C.) **Een Phlebotomussoort in Suriname, *Phlebotomus squamipennis*, Lutz & Neiva.** [*P. squamipennis* in Surinam.]—*Geneesk. Tidschr. Ned. Indië, Batavia*, lix, no. 5, 1919, pp. 676–679.

No species of *Phlebotomus* appears to have been previously recorded from any of the Guianas. Female examples of *P. squamipennis* have been taken in shady places in the virgin forests of the interior of Dutch Guiana.

GRABHAM (M.). **The House Ants of Jamaica as Carriers of Pathogenic Micro-organisms.**—*Jamaica Public Health Bull.* (1917), *Kingston*, 1918, pp. 29–34.

Ants, especially in tropical countries where they are common indoors, are potential carriers of infection by means of their feet, excrement, and casts disgorged after feeding. In Jamaica the five species chiefly concerned are *Iridomyrmex humilis*, Mayr, *Prenolepis longicornis*, F., *Solenopsis geminata*, F., *Monomorium destructor*, Jerd., *Tapinoma melanocephalum*, F., and *Camponotus hannani*, For. The usual measures for destroying the nests are referred to. In describing the method of exploding carbon bisulphide vapour at the mouth of a nest in order to drive the fumes inwards, it is pointed out that after the explosion the vapour continues to burn with a colourless flame, so that any attempt to pour in more carbon bisulphide may have fatal results. The hole should be closed with earth immediately after the explosion. Natural enemies play a very large part in keeping ants in check. They include a predatory ant, *Pheidole fallax*, For., a ground lizard, *Ameiva dorsalis*, and some birds.

TODD (J. L.). **Tick-caused Paralysis.**—*Canad. Med. Assoc. Jl., Toronto*, ix, no. 11, November 1919, pp. 994–996.

Two cases of tick paralysis are described. One proved fatal, the tick responsible being *Haemaphysalis cinnabarina*.

Self-cleaning Canal Screen.—*Engineering News Record, New York*, 15th January 1920. (Abstract in *Trop. Dis. Bull., London*, xvi, no. 4, 15th October 1920, pp. 255–256, 4 figs.)

An arrangement for the removal of leaves and débris from small channels and streams is described. This should prove useful in minor anti-malarial measures.

PEARSON (A.). **Some Notes on Fifteen Years' Experience of Malaria in the Upper Congo.**—*Jl. Trop. Med. & Hyg., London,* xxiii, no. 14, 15th July 1920, pp. 177–180.

These notes on malaria in Katanga, Belgian Congo, deal mainly with quinine prophylaxis and treatment. The enormous importance of mosquito prophylaxis is emphasised.

WENYON (C. M.). **Carriage of Malaria by Hibernating Mosquitoes.**—*Lancet, London,* cxcix, no. 5053, 3rd July 1920, p. 42.

During the summer and winter of 1918 large numbers of mosquitos were captured in a village in Macedonia, where there is a high malaria rate among the children, and where *Anopheles palestinensis* (*superpictus*) abounds. Partly developed oocysts were found all through the winter, and the question arose whether the parasites would continue their arrested development when the temperature became more favourable. This was found to be the case with artificially hibernated mosquitos, and it is quite possible that it would also occur in nature.

Exposure of infected mosquitos with partly developed oocysts to a low temperature in an ice-chest for 12 hours did not produce degeneration in the oocysts, whereas a longer exposure did. It would therefore seem that in nature a temporary exposure to a very low temperature on an exceptionally cold night would not prevent subsequent development.

JAMES (S. P.). **Hibernating Mosquitoes as Carriers of Malaria.**—*Lancet, London,* no. 5054, 10th July 1920, cxcix, p. 99.

The results of field and laboratory work mentioned in the preceding communication may perhaps explain the similar occurrence in England of malarial infections prior to the incidence of the current year's Anopheline mosquitos. Most of the infections of local origin in England happen during August and September, but occasionally some occur as early as May, and these may be explained by supposing *Anopheles maculipennis* infected in autumn to be a carrier in spring.

HEHIR (P.). **Hibernating Mosquitoes as Carriers of Malaria.**—*Lancet, London,* cxcix, no. 5056, 24th July 1920, p. 217.

In India, in the United Provinces and the Punjab, there appear to be two malaria seasons, one in late spring and early summer, and the other in autumn. In order to explain the occurrence of the former, an investigation into the infectibility of hibernating mosquitos should be made. Positive results may lead to the devising of measures against mosquitos in their winter quarters in addition to those hitherto adopted in India during the breeding season.

PURDY (W. C.). **Biological Investigation of California Rice Fields relative to Mosquito Breeding. Progress Report.**—*Public Health Repts., Washington, D.C.,* xxxv, no. 44, 29th October 1920, pp. 2556–2570.

Investigations, similar to those carried out in 1918 in Arkansas [*R.A.E.*, B, viii, 63], were made in 1919 in the rice-growing region of northern California. They included one rice ranch and the waters near by, and the points observed differed in several particulars from the preceding ones. The breeding places of mosquitos (both *Anopheles* and *Culex*) are practically absent from the rice fields themselves, but at the same time moderate or large numbers are bred in neighbouring seepage puddles and natural drainage ditches. For 1 mosquito produced by the rice fields the puddle produces 5 and the ditch 44. The larval food-supply is evidently not responsible for this great discrepancy in numbers of larvae, as it is evenly distributed throughout, and the discrepancy is not, or only to a very minor degree, due to the activity of larval enemies, because these are most numerous where the larvae are most abundant, and *vice versa*. The seepage puddles repeated on a larger scale the fluctuations of the rice fields in numbers of larvae, food content, and number of enemies, but this was not true of the ditches.

The most noticeable difference between the rice fields and the ditches was the heavy growth of blue-green algae and the presence of surface films on the former, the films being absent and the blue-green algae not abundant on the latter. These films do not occur in the Arkansas rice fields, where mosquito larvae are moderately abundant, and green algae predominate there, the normal growth not being very heavy. Rain is frequent during the rice season in Arkansas, but usually absent in California.

Consequently, the natural mechanism of control in the California rice fields seems to be concerned, in part at least, with the general condition of stagnation, the large amount of blue-green algae, and the biological surface films. The last two of these conditions, however, which prevailed on the rice fields from about 20th July to the latter part of September, fail to account for the negative results obtained during June and part of July.

It appears out of the question to control mosquito production in natural, uncared-for waters by attempting to diminish the larval food supply, or by the introduction of natural enemies, except perhaps certain fish.

Further investigation in different parts of the State, to check the negative results obtained from California rice fields, is desirable, and it is also recommended that studies should be made of the biological, chemical and physical conditions that obtain in a field where breeding does not take place, to determine, if possible, the reason for such negative results.

In collections of adult mosquitos, *Anopheles quadrimaculatus occidentalis* (thought to be an efficient vector of malaria) was the most numerous. It was present throughout the year, and very abundant in August and September. Males probably do not live through the winter, as none were found from 19th November to 27th April. *A. pseudopunctipennis* also occurred, as well as a few Culicines.

Woo (S. M.). **Famine and Typhus Fever in China: A Simple Delousing Building.**—*China Med. Jl., Shanghai*, xxxiv, no. 5, September 1920, pp. 572–574, 1 fig. [Received 3rd December 1920.]

In view of the fact that an epidemic of typhus may be expected to occur during the next few months in the famine-stricken provinces of China where typhus is endemic, a form of delousing station for construction in or near the hospital compound is described. A small box-shaped mud or brick building should be made, with gas-proof walls and one small door opening outwards, with a capacity of 1,000 or 2,000 cu. ft. and a height of not over 7 ft. The clothes to be disinfected should be hung on wooden poles laid across the room about 6 in. below the ceiling and 1 ft. apart.

The usual methods of disinfection with sulphur or with hydrocyanic acid gas are described.

Information concerning Rat Surveys and Rat Proofing ; with a Model Ordinance designed to regulate Building with reference to Rat Proofing.—*Public Health Repts., Washington, D.C.*, xxxv, no. 45, 5th November 1920, pp. 2615-2628.

The danger of bubonic plague in the United States, and the economic loss caused by it and by the depredations of rats in general are emphasised, extensive quotations being given from a paper by Creel in 1913 [*Public Health Repts.*, xxviii, no. 27]. The annual loss due to rats in the United States was there estimated at £33,400,000. This is followed by an account by C. V. Akin of the major requirements necessary in the conduct of a rat survey in a given area with a view to finding whether plague is present among the rats, as this may be the case for some time before the infection is transmitted to man. The methods of making buildings, etc., rat-proof are also detailed, together with a specimen building ordinance adaptable to any given district, requiring every building, etc., that is erected to be rat-proofed.

Barbieri (A.). **La Substitución de los Ranchos por Viviendas higiénicas, en las Provincias afectadas por el Paludismo.** [The Substitution of hygienic Dwellings for native Huts in the Provinces affected by Malaria.]—*Anales Dept. Nac. Higiene, Buenos Aires*, xxvi, no. 3, May–June 1920, pp. 185–198, 10 figs. [Received 7th December 1920.]

The majority of the native working population in Argentina lives in unlighted, badly-ventilated huts exposed to all changes of climate, and the result is that such diseases as malaria, tuberculosis, plague, typhus, etc., are rife. The use of wire screens at doors and windows as a protection against mosquitos would be quite ineffective in these habitations. It is suggested that this is a problem for the government to face, and that the National Department of Hygiene might be given facilities for gradually replacing these dwellings with hygienic and convenient habitations. Investigation has shown that more than 50 per cent. of the poorer class dwellings in the northern provinces of Argentina, which are zones of endemic malaria, consist of these miserable huts. Model portable dwellings of ferro-concrete, suitable for replacing the present huts, are described and illustrated, and their approximate cost is worked out.

Movimiento técnico y administrativo. [Technical and Administrative Activities.]—*Anales Dept. Nac. Higiene, Buenos Aires*, xxvi, no. 3, May–June 1920, pp. 227–234. [Received 7th December 1920.]

Cases of bubonic plague having been reported from the Province of Catamarca, in April 1920, precautionary measures were taken, including thorough disinfection of more than forty dwellings. Only nine cases of plague occurred in all, and the rats were exterminated in all buildings where they were likely to occur.

A circular has been prepared and distributed throughout the provinces of Argentina, drawing attention to the dangers arising from the presence of rats and fleas.

Fermi (C.). **Si può col Metodo Grassi (Bonifica umana e Protezione meccanica) smalarizzare l' Italia in pochi Anni ? Prima Replica alle Critiche mosse dal Grassi.** [Is it possible to free Italy from Malaria in a few Years by the Grassi Method (Treatment of Man and mechanical Protection against Mosquitos)? First Reply to Grassi's Criticisms.]—*Rome,* Tipografia L. Adriani, 1920, 32 pp.

This paper is controversial in nature. Professor Grassi is quoted as stating that Italy can be freed from malaria in a few years by the prophylactic treatment of man and the use of screens without drainage and other land reclamation work. The author believes anti-mosquito work and land reclamation to be superior to screening and prophylaxis by means of drugs.

Martini (E.). **Ueber Stechmücken, besonders deren europäische Arten und ihre Bekämpfung.** [Mosquitos, particularly the European Species, and their Control.]—*Arch. Schiffs- u. Trop.-Hyg., Leipsic,* xxiv, Beiheft 1, August 1920, 267 pp., 117 figs., 4 plates.

This monograph is intended for the practical worker and should prove very helpful. The general section deals with the economic importance of mosquitos, their anatomy, life-history, classification and natural enemies, and methods of collecting them. The second section is devoted to the Anophelines of Central and Southern Europe. Culicines form the subject of the third part. A fourth section describes the protective and combative measures that are adopted against them. The keys are supplemented by explanatory figures. A list of 343 references completes the volume.

Martini (E.). **Mückenplage in der Marsch, Chaetotaxis der Culicidenlarven und anderes.** [The Mosquito Plague in the Marsh District, Chaetotaxy of Culicid Larvae, and other Notes.]—*Arch. Schiffs- u. Trop.-Hyg., Leipsic,* xxiv, no. 11, November 1920, pp. 337–340.

In observations made in June 1920 *Culex pipiens, Aëdes annulipes,* and *A. terrieï* began biting at dusk. In dull weather, in buildings or woods, all these species may bite by day, but in open country they rarely attack during the day even in places where they swarm in the evening. The typical forest species behave differently: *Ochlerotatus maculatus* (*cantans*) and *O. nemorosus* bite throughout the day, especially in the morning; *Aëdes cinereus* does the same, but prefers the evening. *A. cinereus* and *A. sylvae* bite as late as October.

Tests show that the action of repellents is quite temporary. Creosote ointment, which was the best, proved effective for about 15 minutes. When the treated part of the body is covered, if only with a loose handkerchief, the effect is enhanced and is less fugitive. In the case of animals the hair may thus preserve the effect of odorous substances.

Some notes on chaetotaxy are given. *A. hyrcanus* (*sinensis*) and the species of the *Myzorhynchus* group are characterised by a marked development of bristles on the antennae; this character, though to a less extent, is also found in *A. maculipennis, A. punctipennis,* and related species. All these species appear to be comparatively non-susceptible to malignant tertian malaria, whereas carriers of this form and of malaria generally are species with less development of hairs.

SIKORA (H.). **Beobachtungen an Rickettsien, besonders zur Unterscheidung der *R. prowazeki* von *R. pediculi*. Vorläufige Mitteilung.** [Observations on *Rickettsia* spp., particularly concerning the Differentiation of *R. prowazeki* from *R. pediculi*. Preliminary Communication.]—*Arch. Schiffs- u. Trop.-Hyg., Leipsic,* xxiv, no. 11, November 1920, pp. 347–353, 1 fig.

The contents of this paper are indicated by its title.

FRIEDERICHS (K.). **Neues über Kriebelmücken.** [New Information on Simuliids.]—*Berliner Tierärztl. Wochenschr., Berlin,* xxxvi, no. 48, 25th November 1920, pp. 567–569.

Since the publication of a preliminary paper [*R.A.E.*, B, viii, 215] new facts render a further one desirable, and the key previously given is reprinted in a more complete form.

Simulium nölleri, sp. n., is described from Thuringia. Another species, *S. austeni*, Edw., from Hamburg, appears to be new to Germany. The male differs from *S. morsitans*, Edw., only in the form of the hypopygium.

Edwards has expressed doubt whether *S. ornatum, S. aureum* and *S. latipes* are blood-suckers in England [*R.A.E.*, B, iii, 140]. In Mecklenburg cattle are never attacked by them, nor by *S. pratorum*. In fact, they do not bite warm-blooded animals. There may be even more non-biting species. This accounts for the absence of losses among cattle in Mecklenburg, the biting species, *S. maculatum, S. reptans* and *S. argyreatum*, being scarce there.

RUPPERT (—). **Beobachtungen über Schadwirkungen von Kriebelmücken bei Schafen in der Umgebung von Friesack (Mark).** [Observations on Simuliid Injury to Sheep in the Neighbourhood of Friesack (Mark).]—*Deutsche Tierärztl. Wochenschr., Hanover,* xxviii, no. 49, 4th December 1920, pp. 579–580.

An account is given of injury to sheep in 1920 as a result of Simuliid bites. A number of the animals had to be slaughtered. Cattle were also severely attacked in 1918, 1919 and 1920.

VAN BREEMEN (M. L.). **Further Particulars relating to the Malaria Problem at Weltevreden and Batavia.**—*Meded. Burg. Geneesk. Dienst Ned.-Indië, Weltevreden,* 1920, no. 4, pp. 63–115, 1 plate, 1 map.

In a previous report [*R.A.E.*, B, vii, 96] the author attributed to fishponds the responsibility for a large amount of malaria owing to their breeding *Anopheles* (*Myzomyia*) *ludlowi*, Theo., in enormous numbers. This paper contains final conclusions by the author and Dr. A. L. J. Sunier on the subject.

Besides the marine fishponds, there are many other swamps in the brackish water area that are important as breeding places. Under certain conditions, such as the temporary or local absence of the fish, *Haplochilus panchax*, and other enemies of mosquito larvae and pupae, enormous quantities of mosquitos may be produced.

The only satisfactory means of making the fishponds entirely and permanently harmless is to fill up the marine fishponds and to drain thoroughly and cultivate the whole brackish water area north of Batavia.

At Batavia, fishponds in a well-drained littoral area may be harmless as a source of malaria if (1) only sea-water is allowed to enter the ponds, in order to keep the salt-content as high as possible ; (2) a sufficient number of the fish, *Chanos chanos*, is kept in the ponds to ensure that all under-water and other vegetation is eaten ; (3) care is taken that, besides the other fish bred in the ponds, a sufficient quantity of *Haplochilus panchax* is maintained. Such harmless fishponds are to be found north of Batavia. Their drawback is that there is no excess of vegetation as food for *C. chanos*, which is therefore of less market value. Artificial food might solve this difficulty.

From a hygienic standpoint, however, the abolition of the ponds is the only satisfactory measure.

LLAMBIAS (J.) & LORENZO (D.). **Dermatose causée par un Parasite du Blé.**—*C.R. Soc. Biol., Paris*, lxxxiii, no 35, 4th December 1920, p. 1528.

Attention is drawn to the skin affection caused by *Pediculoides ventricosus*. The cases under observation were amongst men handling sacks of corn, the mites being found on the sacking. Treatment with a lotion of warm water and vinegar proved effective.

OLIVEAU (A.). **Sur un petit Foyer de Paludisme reconnu pendant les Années 1919–1920 au Centre d'Aviation Maritime de Saint-Raphaël (Var).** [A small Malarial Focus recognised during 1919–20 in the Naval Aviation Centre of Saint-Raphael (Var).]—*Bull. Soc. Path. Exot., Paris*, xiii, no. 9, 10th November 1920, pp. 729–732.

The establishment of a new malarial centre in the county of Var is recorded. The 15 cases of primary infection here described had never previously resided in any known malarial district. *Anopheles maculipennis* is apparently abundant in the area under discussion, and the climatic conditions are favourable to development of the malarial parasite. This was probably introduced into the locality by infected troops passing through it.

MANSION (J.). **Une nouvelle Station de Phlébotomes en France.**—*Bull. Soc. Path. Exot., Paris*, xiii, no. 9, 10th November 1920, pp. 735–738.

Attention is drawn to the finding of the female of a species of *Phlebotomus* at Bron-Village (Rhône). Owing to lack of information regarding the specific characters of the females of this genus, the species cannot be identified with certainty. It does not agree with França's description of the female of *P. papatasii*. The individuals were caught in August, and it was observed that if the temperature dropped appreciably below 20° C. [68° F.] for several days, the midges disappeared.

Commenting on this paper M. Roubaud remarks that a species apparently resembling the above was caught by him at Clermont-Ferrand.

SURCOUF (J.). **Note sur les Variations du *Tabanus nemoralis*, Meigen.**—*Bull. Soc. Entom. France, Paris*, 1920, no. 16, pp. 268–269.

Tabanus nemoralis var. *ruficornis*, n., is described from Algeria, and has also been taken in Syria.

Brolemann (H. W.). **Encore un Mot sur les Culicides [Dipt.].**—*Bull. Soc. Entom. France, Paris,* 1920, no. 16, 27th October 1920, pp. 269–272.

The genital armature of Culicids is discussed, with reference to the recent paper of Edwards [*R.A.E.*, B, viii, 156] and his criticism of the author's previous observations.

Séguy (E.). **Note sur quelques Moustiques [Dipt.] peu connus ou nouveaux pour la Faune française.**—*Bull. Soc. Entom. France, Paris,* 1920, no. 15, 13th October 1920, pp. 251–253.

The mosquitos dealt with in this paper, as being either new or little known to the French fauna, are *Culex laticinctus*, Edw., common in the Mediterranean region ; *Aëdes* (*Stegomyia*) *vittatus*, Big. ; *A.* (*Finlaya*) *geniculatus*, Ol., which is abundant and widely distributed, and was previously recorded from Corsica as *A. jugorum* ; *Ochlerotatus maculatus*, Meig., the larvae of which were found in a small, isolated marsh at Meudon, in May ; *O. lesnei*, Séguy, from Seine-et-Marne, etc. ; *O. mariae*, Serg., from Toulon ; *O. curriei*, Coq. ; *O. caspius*, Pall. ; *O. punctor*, Kirby ; *O. sticticus*, Meig. ; and *Orthopodomyia pulchripalpis*, Rond., a rare species.

It is remarked that this latter species, hitherto placed in *Grabhamia* or *Ochlerotatus*, should certainly belong to *Orthopodomyia*. The larvae of this genus live in water-holes in trees, in company with *A. geniculatus*, Ol., and *Anopheles* (*Coelodiazesis*) *plumbeus*, Hal.

Clarke (J. T.). **Tropical Fleas.**—*Brit. Med. Jl., London,* no. 3128, 11th December 1920, p. 921.

Attention is drawn to a paper by Bacot [*R.A.E.*, B, viii, 3] in which the world-wide distribution of *Pulex irritans* is emphasised. Similar statements have been made elsewhere, and as the author's theory of the transmission of rheumatic fever by fleas is based on their geographical distribution [*R.A.E.*, B, viii, 75], the occurrence of *P. irritans* in the tropics would destroy it. A request is made for the publication of the evidence on which the statements that *P. irritans* is ubiquitous are based.

Muir (F.). **A convenient Mosquito Poison.**—*Hawaiian Planters' Record, Honolulu,* xxiii, no. 5, November 1920, p. 268.

A solution of two grains of powdered para-dichlorobenzene or camphor, in lump or powder, to one litre of water, renewed every 10 days, has proved a successful measure against the yellow fever mosquito [*Stegomyia fasciata*]. It is especially convenient for use in such breeding places as flower vases and other water containers in which the use of oil is impracticable.

Doten (S. B.). **Biting-flies of Cattle.**—*Nevada Agric. Expt. Sta. Ann. Rept. 1918–19, Reno,* 1920, p. 38.

Progress towards the completion of the life-histories of *Tabanus phaenops* and *T. punctifer* is described. The introduction of egg-parasites for the control of *T. phaenops* was attempted, but the results cannot yet be ascertained.

A difficult feature of the studies was the egg-laying habits of *T. phaenops*, the most troublesome of the flies recorded. A considerable number of egg-masses were found on short grass and sedgy growths in typical wet meadows. Larvae in various stages of growth were also observed.

The most important point still remaining for investigation is the study of the moisture conditions in the soil that are suitable for the larvae. Apparently they require soils wet and soft enough to allow them to range freely in search of food. Attempts will be made to find out whether they occur anywhere except in the swampy, undrained meadow lands. These studies will probably show that the only hope of any great decrease in the number of these flies lies in the drainage and reclamation of the valleys where they are now abundant. The introduction of egg-parasites will, however, be continued, and may in the long run prove effective.

CIMATTI (V.). **La Zecca parassita degli Animali da Cortile.** [The Tick parasitising domestic Birds.]—*Riv. Agric., Parma,* xxv, no. 50, 10th December 1920, pp. 633–634.

This is a popular article on *Argas reflexus,* and contains no new information. The measures advised against this tick are those adopted against *A. persicus* (*miniatus*) [*R.A.E.*, B, i, 115, etc.].

ECKSTEIN (F.). **Die einheimischen Stechmücken.** [Mosquitos native to Germany.]—*Einzeldarstellungen aus dem Gebiet der angewandten Wissenschaften,* no. 3, *Munich,* Verlag Natur & Kultur, Dr. F. J. Völler, 1920, 58 pp., 17 figs. Price 4 Marks.

This monograph describes the habits of German mosquitos and gives keys for their determination with a view to aiding the efforts now being made in anti-mosquito work on a large scale. Much of the information has been already noticed [*R.A.E.*, B, vii, 69, 173 ; ix, 19]. A concise account of methods of carrying out remedial measures concludes this work.

MALLY (C. W.). **Some Zoological Factors in the Economic Development of South Africa.**—*S. African Jl. Sci., Johannesburg,* xvii, no. 1, November 1920, pp. 64–75.

The big game still existing in South Africa is now regarded chiefly as a source of danger from the standpoint of diseases that can be transmitted to man, and it seems inevitable that it must eventually disappear in favour of the domestic animals that are associated with man in Europe and America. It is suggested, however, that thorough research on the reaction between the game animals and the pests and diseases of which they are reservoirs, may lead to important discoveries on the question of immunity or resistance. If possible, colonies of all the species should be preserved under conditions that will not permit of their being a source of hindrance or danger to man.

There is undoubtedly great need for thorough research into the question of the connection between insects and disease. In particular, the louse, *Pediculus humanus,* and the bedbug, *Cimex lectularius,* require special attention on account of their influence on the efficiency of labour. Cattle and sheep are dipped as a remedy for ticks and scab for economic reasons, and it would also be an equally advantageous practice, from an economic standpoint, to fumigate with hydrocyanic acid the clothing and sleeping quarters of the poorer classes and the natives against these pests. A problem in disease that has already been brought to the point where control is possible is the elucidation of the life-cycle and economy of the bont tick [*Amblyomma variegatum*] in its relation to heart-water in sheep, goats and cattle. This has made it possible for the merino sheep and the Angora goat to be reared again on farms that were abandoned 25 or 30 years ago on account of the prevalence of the disease.

MILKS (H. J.). **The Diagnosis and Treatment of certain Skin Diseases of Small Animals.**—*Jl. Amer. Vet. Med. Assoc., Washington, D.C.*, N.S. xi, no. 3, December 1920, pp. 289–300.

A few of the more important non-parasitic diseases are dealt with, and also the different forms of mange—sarcoptic, otodectic and follicular.

For parasitic otorrhea (ear mange) in cats and dogs, Glass advises 1 part of nitrate of mercury to 8 of almond oil, and the author had fair success with 1 part of this ointment to 3 of lard, but the treatment must be persisted in for a considerable time to effect a cure. The same treatment also succeeded in some cases of the squamous type of follicular mange.

CHAMBERLIN (R. V.). **South American Arachnida, chiefly from the Guano Islands of Peru.**—*Brooklyn Mus. Sci. Bull., Brooklyn*, iii, no. 2, 27th September 1920, pp. 35–44, 1 plate.

The ticks found were the Argasids, *Ornithodoros amblus*, larvae, probably of this species, being found on penguins (*Spheniscus humboldti*), and *Ornithodoros talaje*, Guér., on a nestling booby (*Sula nebouxi*).

FRASER (A. D.). **Notes on Blood-sucking Flies in North Russia during the Summer of 1919.**—*Bull. Ent. Res., London*, xi, pt. 3, December 1920, pp. 195–198.

Tabanids in North Russia are extraordinarily abundant and aggressive, so much so that the inhabitants perform most of their outdoor work during the night, and keep their animals in sheds during the heat of the day. Paraffin is sometimes used as a repellent.

Flies of the genus *Tabanus* were the greatest pest, being much more numerous than those of *Haematopota* and *Chrysops*. *Tabanus tarandinus*, L., *T. maculicornis*, Ztt., and *T. nigrifacies*, Gob., were widely distributed, and were the predominating species in the first half of the summer, after which they were gradually replaced by others. *Haematopota* appeared to be a more active biter than *Tabanus*, considering its smaller numbers. Flies of the genus *Chrysops*, of which *C. caecutiens* was numerous near water, were not so troublesome, owing to their smaller numbers and their habit of rarely commencing to bite on first alighting.

There is no evidence that any of the flies with which this paper is especially concerned conveyed any disease to man or domestic animals, but much discomfort and annoyance was experienced from their constant attacks, and some individuals suffered from bites that developed into septic sores requiring medical attention.

In an appendix to this paper by Major Austen attention is drawn to other papers on the same subject [*R.A.E.*, B, iii, 195], and an instance is quoted of settlers in parts of Siberia, such as the shores of the river Om, having been compelled entirely to abandon the zone infested by these flies. A list is given of the Tabanids and other biting flies taken by Major Fraser and other collectors during 1918–19.

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MAYNE (B.). **One or several Species of Malaria Parasites? A Review of Recent Work bearing on this Question.**—*Public Health Repts., Washington, D.C.*, xxxv, no. 48, 26th November 1920, pp. 2846–2858.

A review of a considerable amount of literature both for and against the unitarian theory of malaria [*R.A.E.*, B, viii, 169, 195, 196; etc.] is followed by an account of inoculation experiments confirming the idea of constancy of species. A typical illustration is also given of a series of mixed infections as an example of a case that might be used to defend either hypothesis. The conclusion reached is that without more data from blood cultures and mosquito inoculation experiments it is impossible definitely to prove that the plurality of species is not the normal status; and that the principle of transmutation remains merely an interesting hypothesis.

EDWARDS (F. W.). **On the British Species of *Simulium*.—ii. The Early Stages; with Corrections and Additions to Part i.**—*Bull. Ent. Res., London*, xi, pt. 3, December 1920, pp. 211–246, 7 figs.

Notes are given on the habitat of the various larvae; the diagnostic characters of the larvae and pupae; seasonal variation, in the one or two cases in which it occurs; range of flight; parasites, including a worm of the genus *Mermis*, the sporozoans *Glugea* spp., and an undetermined Gregarine, none of which occur in large numbers; and other points of interest.

The opinion expressed in the first part of this paper [*R.A.E.*, B, iii, 140] that some of the commonest British species of *Simulium* are probably not blood-suckers is here altered in view of abundant evidence that both *S. ornatum* and *S. latipes* will attack man; and though there are still species (such as *S. aureum*) against which there is no evidence, it is assumed that all the species may develop this habit on occasion. The blood-sucking propensity apparently depends much more on the weather than the particular species; a still, warm and sunny afternoon, particularly in the spring, will always rouse the flies to activity.

Keys are given for the larvae and pupae, together with revisions of those previously published for the adults of both sexes [*loc. cit.*]. The male and female previously described as *S. aureum*, Fries, really belong to different species—the former to *S. angustitarse*, Lundstr., while the insect described as *S. angustipes* is the true male of *S. aureum*. *S. aureum* also occurs in North America under the name of *S. bracteatum*, Coq. The insect described as *S. austeni* is so closely allied in all stages to the North American *S. venustum*, Say, that it cannot be ranked as more than a local race.

The following new species and varieties are described:—*S. ornatum* var. *nitidifrons*, *S. subornatum*, *S. reptans* var. *galeratum*, *S. yerburyi*, and *S. tredecimatum*. The last-named is described from the larvae and one pupa only, the adult being unknown.

DALZIEL (J. M.). **Crab-holes, Trees, and other Mosquito Sources in Lagos.**—*Bull. Ent. Res., London*, xi, pt. 3, December 1920, pp. 247–270.

The importance of crab-holes as a breeding place for mosquitos is often greatly underestimated. In many cases in Lagos the numbers of mosquitos issuing from a very few holes in the vicinity of houses

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is so great that even if the species are not those at present known to be concerned in conveying disease, an effort to eliminate the breeding places is called for if it can be shown that the insects contribute appreciably to man's discomfort, reasonable comfort being one of the first conditions of health maintenance in the tropics.

The holes in question are made by a land-crab, *Cardisoma armatum*. Every crab-hole, except those daily washed by the tide, is a potential source of mosquitos, if the water in it is not too brackish. The method first employed in dealing with the holes was to pour into them a disinfectant such as cyllin, with either cold or boiling water (about 1:9). The latter was more effective in killing the crab, and had the further advantage that cheap tar or crude creosote could be used. However, a proportion of the crabs survived this treatment, and the hole reappeared in a day or two; and eventually the practice adopted for general use was simply to dig out the crab. Mere obliteration of the hole without destruction of the crab is a waste of time.

The mosquito larvae found in crab-holes were, in order of frequency, *Ochlerotatus irritans*, *Culex decens* (*invidiosus*), *Uranotaenia annulata*, *Ochlerotatus nigricephalus*, *Stegomyia fasciata* (7·3 per cent. of the total number), *Anopheles costalis*, *Culex insignis*, *Culiciomyia nebulosa*, *Culex thalassius*, *C. rima*, *C. salisburiensis*, *Uranotaenia bilineata* var. *fraseri*, *Stegomyia luteocephala*, and *Micraëdes inconspicuosus*. All except the last two were also taken as adults in the crab-holes, as were in addition *Ochlerotatus punctothoracis*, *O. caliginosus*, *Culex fatigans*, *C. consimilis*, and *Mansonioides africanus*. The peculiar habit of the larva of *M. africanus*, however, in relation to water lettuce (*Pistia stratiotes*) suggests that it does not breed in crab-holes; the other four probably do so occasionally.

References to crab-hole mosquitos in various parts of the world are given [*R.A.E.*, B, i, 64; etc.], and their relation to man is considered. Crab-holes supply an almost domestic source of *S. fasciata*; their connection with *A. costalis*, however, seems to be more or less accidental. Both these insects, which occurred in equal numbers, are carriers of *Filaria bancrofti*.

An account is given of the collection of mosquito larvae in tree-holes, with lists of the species of mosquitos and trees concerned; and an account and lists are also given of the mosquitos breeding in wells, boats and canoes, roof-gutters, native pots, and various domestic sources, and of the adult mosquitos collected.

Lamborn (W. A.). **The Habits of a Dipteron Predaceous on Mosquitos in Nyasaland.**—*Bull. Ent. Res., London*, xi, pt. 3, December 1920, pp. 279–281.

An Anthomyiid fly of the genus *Lispa* was observed to be predaceous on mosquitos. The latter were usually attacked just before they had emerged from the pupa-case, or before their wings had expanded properly. In one case the fly drew a mosquito pupa from the water, impaled on its proboscis. Another Dipteron also occurred that was probably predaceous on mosquito larvae.

The pool where these observations were made was swarming with *Culex* larvae, and there were a few predaceous larvae of a much larger species of mosquito, probably either *Toxorhynchites brevipalpis*, Theo., or *Culex tigripes*, Grp., which were seen attempting to secure the ordinary *Culex* larvae, and successfully preying on Syrphids.

MacGregor (M. E.). **A New Type of Entomological Killing-bottle.**—*Bull. Ent. Res., London,* xi, pt. 3, December 1920, pp. 283–285, 1 fig.

A killing-bottle for use with chloroform is described that has the merit of preventing the rapid evaporation of the fluid, so that 5 cc. of chloroform is sufficient for a week's use. The apparatus may be most easily made with a large test-tube, but could be adapted if a very large mouthed bottle were required. The chloroform is kept at the bottom of the tube by a red rubber cork, through which passes a small piece of glass tubing (internal diameter, 2 to 3 mm.). None of the chloroform escapes owing to the air pressure at the upper end of the tubing, but there is always a high concentration of chloroform vapour in the test-tube.

Newstead (R.). **On the Genus** *Phlebotomus.*—**Part IV.**—*Bull. Ent. Res., London,* xi, pt. 3, December 1920, pp. 305–311, 4 figs.

Notes are given on a number of species of *Phlebotomus* with a view to supplying materials for the study of the geographical distribution of this group. Two forms, both pale and dark, of the male (hitherto unknown) of *Phlebotomus antennatus,* Newst., are described from the Gold Coast, as is *P. signatipennis,* sp. n. *P. caucasicus,* Marz., is regarded as a synonym of *P. sergenti,* Parr., both sexes of which are redescribed from Persian specimens, and a variety of the male from Mesopotamia is described. *P. walkeri,* sp. n., from the boundaries of Bolivia and Brazil, has been previously described, but recorded as *P. longipalpis,* Lutz & Neiva [*Bull. Ent. Res.,* v, pt. 2, p. 189].

Strindberg (H.). **Können die Mallophagen sich auch vom Blut ihrer Wirtstiere ernähren?** [Can the Mallophaga also feed on the Blood of their Hosts?]—*Zool. Anzeiger, Leipzig,* xlviii, no. 8, 16th January 1917, pp. 228–231.

It is stated that *Nirmus* spp. and *Menopon* spp. may feed on the blood of their host under natural conditions. This is probably also the case with *Physostomum* spp., whereas *Docophorus* spp. and others do not do so.

Rodhain (J.) & Bequaert (J.). **Oestrides d'Antilopes et de Zèbres recueillis en Afrique orientale, avec un Conspectus du Genre** *Gasterophilus.* [Oestrids of Antelopes and Zebras collected in Oriental Africa, with a Review of the Genus *Gastrophilus.*]—*Rev. Zool. Africaine, Brussels,* viii, no. 2, 15th November 1920, pp. 169–228.

The Oestrids described in this paper were mostly collected in ex-German East Africa during the Belgian campaign in 1917.

Larvae from antelopes (*Damaliscus* sp. and *Bubalis* sp.) appear to be those of *Gedoelstia hässleri* and *G. cristata.* Comparison of the former and those previously described as *G. paradoxa* shows these two species to be identical. The synonymy and geographical distribution of *G. cristata,* R. & B., and *G. paradoxa,* R. & B., are dealt with.

The Oestrids of zebras are:—*Rhinoestrus purpureus*, Br., found in the cervical cavities, and *Gastrophilus pecorum*, F., var. *zebrae*, n., *G. gedoelsti*, sp. n., and other unidentified species of *Gastrophilus* all taken from the stomach.

A synoptic table of *Gastrophilus* larvae in the third stage is given, with lists of species arranged according to those known in the larval or adult stage only, as well as those known in both stages.

Previous work on the pathological effect of the larvae and the method adopted in America for their extermination is discussed.

WILHELMI (J.). **Ueber** *Stomoxys calcitrans*, **L.**—*Sitzungber. Ges. Naturf. Freunde, Berlin*, March 1917, no. 3, pp. 179–195, 3 figs.

This paper deals with the results of various observations on *Stomoxys calcitrans*, L., full details of which have been published elsewhere [*R.A.E.*, B, viii, 103].

WILHELMI (J.). **Zur Biologie der kleinen Stechfliege,** *Lyperosia irritans*, **L.** [Biology of *L. irritans.*]—*Sitzungsber. Ges. Naturf. Freunde, Berlin*, October–December 1917, no. 8–10, pp. 510–516, 1 fig.

Lyperosia irritans, L., unlike *Stomoxys calcitrans*, is never found in large numbers in stables. It is most abundant in the open, and has apparently no preference for light or shade. It is a blood-sucker, and although found on horses and dogs, it apparently chiefly attacks cattle; on one animal as many as 1,000 individuals may be seen at once. This fly is most abundant during June, but has not been seen after August. About 15 to 23 eggs are laid by each female. These hatch in from 2 to 3 days, pupation occurring about 7 days later and lasting at least 8 days. The shortest period noticed, during fairly warm weather, from egg to adult was 17 days, but under cooler conditions it may require 30 days or more. Although eggs were found in cattle dung, and this was used for breeding purposes under laboratory conditions, it is not apparently the chief site for larval development, as no pupae were ever found in manure heaps in the field. The natural enemies of this fly are probably the same as those attacking *Stomoxys calcitrans* [*R.A.E.*, B, viii, 103]. During the present observations a mite, apparently distinct from *Holotaspis* sp. attacking *S. calcitrans*, was found on the adults, and the larvae were attacked by larvae of an Anthomyiid fly, *Hydrotaea dentipes*.

HASE (A.). **Beobachtungen über den Kopulationsvorgang bei der Bettwanze** (*Cimex lectularius*, **L.**). [Observations on the Pairing of *C. lectularius.*]—*Sitzungsber. Ges. Naturf. Freunde, Berlin*, October 1918, no. 8, pp. 311–321, 6 figs.

The contents of this paper are indicated by its title.

SCHULZE (P.). **Bestimmungstabelle für das Zeckengenus** *Hyalomma*, **Koch.** [Identification Table for the Tick Genus *Hyalomma*, Koch.]—*Sitzungsber. Ges. Naturf. Freunde, Berlin*, May–June 1919, no. 5–6, pp. 189–196, 6 figs.

A key is given to the species of the genus *Hyalomma*. The species *hippopotamense* and *monstrosum* are not considered as belonging to this genus, and the genera *Cosmiomma* and *Nosomma* respectively have been erected for them.

The new species dealt with include *H. detritum*, from Macedonia, Transcaspia, Turkestan, Bokhara and Peking; *H. detritum albipictum*, from Tsingtau; *H. pusillum* from Arabia; *H. pusillum alexandrinum* from Egypt; *H. aegyptium mesopotamium* from Mesopotamia; *H. aegyptium albiparmatum* and *H. planum* from East Africa; *H. depressum* from Spain, the Canary Isles and North Africa; and *H. nitidum* on buffalos in Kamerun.

Schülze (P.). **Eine Bethylide (Hymen.) als Quälgeist des Menschen in Mazedonien.** [A Bethylid as a Tormentor of Man in Macedonia.]—*Sitzungsber. Ges. naturf. Freunde, Berlin*, 1919, no. 9, pp. 378–381, 2 figs.

An insect much feared in Macedonia, where it bites man, usually at night and chiefly indoors, has been identified as the Bethylid, *Sclerodermus sidneyanus*, Westw. It appears not to be a case of deliberate attack, the insects probably seeking shelter in the clothing and biting when disturbed by any movement.

A note is also given on a Reduviid bug, *Ploiaria domestica*, Scop., found on walls and under mosquito nets. It apparently feeds on engorged specimens of *Phlebotomus papatasii*, Scop., and probably also on bed-bugs.

Reichenow (E.). **Der Entwicklungsgang der Hämococcidien *Karyolysus* und *Schellackia* nov. gen.** [The Development of the Haemococcidia, *Karyolysus* and *Schellackia*, gen. n.]—*Sitzungsber. Ges. Naturf. Freunde, Berlin*, December 1919, no. 10, pp. 440–447, 1 plate.

The information here given concerning *Karyolysus* has already been noticed [*R.A.E.*, B, viii, 208]. During these observations, which were carried out in Spain, three parasites were found that could not be placed in this genus owing to differences in their development, and a new genus *Schellackia* was erected for their reception. *Schellackia bolivari* was found in *Acanthodactylus vulgaris* and *Psammodromus hispanicus*, and its development in these lizards is described. This parasite is also carried by the Gamasid mite, *Liponyssus saurarum*, Oudms., but the latter is only a mechanical carrier and not at all essential to the development of the parasite. Infection has been produced by feeding healthy lizards on the livers of infected animals.

Nicholls (H. M.). **A Chalcid Parasite of Diptera.**—*Science & Industry, Melbourne*, ii, no. 10, October 1920, pp. 607–609, 3 figs.

An account is given of a parasite of Tabanids, blowflies and other Diptera in Tasmania, which attaches itself to the pseudo-tracheal tubes of its host by strong, hooked jaws. It appears to be somewhat similar to a hyper-parasite infesting larvae of *Limnerium validum* in the caterpillars of *Hyphantria textor*, which was found in America, and proved to be a stage in the development of a Chalcid belonging to the genus *Perilampus*. A somewhat similar stage in the life-history of another Chalcid, *Orasema viridis*, had been named "planidium," to indicate the motile and wandering habits that it possesses.

The Tasmanian parasite has a general resemblance to the American ones, but differs somewhat in anatomical details, and also in its habits, as it appears to be entirely an ecto-parasite, spending the whole of its larval existence attached to the proboscis of its host. If it is removed, it can, however, crawl about quite actively, and seems at home when placed in water.

It is sometimes found in great numbers, especially on species of *Tabanus*. No less than 74 individuals were found on a single proboscis. When attacked to this extent the flies seem incapable of feeding properly, and become weak and sluggish.

De Stefani (T.). **Myiasis negli Animali domestici.** [Myiasis in domestic Animals.]—*Allevamenti, Palermo*, ii, no. 1, 15th January 1921, pp. 18–19.

This popular article on Diptera causing myiasis in domestic animals describes cases due to *Hypoderma bovis*, De G., and *Gastrophilus equi*, F. It is said that the offspring of an Anglo-Irish stallion in the Roman Campagna sickened and died in winter owing to infestation by *G. equi*, whereas native horses remained immune. The latter have strongly developed skin muscles, the violent contractions of which not only drive away the fly, but cause the larvae and eggs to drop off.

Kröber (O.). **Die *Chrysops* Arten der paläarctischen Region nebst den Arten der angrenzenden Gebiete.** [The species of *Chrysops* of the Palaearctic Region and neighbouring Areas.]—*Zool. Jahrb., Jena*, Abt. System. Geogr. Biol., xliii, no. 1–4, 1920, pp. 41–160, 2 plates, 12 figs.

A list is given of the Palaearctic species of *Chrysops* and their synonymy, as well as one arranged according to their geographical distribution. Keys are given to both sexes of *Nemorius*, *Chrysops* and *Heterochrysops*.

Some 54 species are described, including the new species *Chrysops pseudoricardoae*, from Turkestan; *C. loewi*, from Siberia; *C. hermanni*, from the Caspian Sea; *C. minutus*; *C.* (*Heterochrysops*) *interruptus*, from Armenia, Caucasus, Kurdistan and Astrachan; and *C. beckeri*, from Turkestan.

Koch (A.). **Messende Untersuchungen über den Einfluss von Sauerstoff und Kohlensäure auf *Culex*-Larven bei der Submersion. Studien an Culiciden. I.** [Measuring Investigations on the Effect of Oxygen and Carbonic Acid on *Culex* Larvae when submerged. Studies on Culicides. I.]—*Zool. Jahrb., Jena*, Abt. Allgem. Zool. & Physiol., xxxvii, no. 4, 1920, pp. 361–492, 21 figs.

The author's summary of this paper has already been noticed [*R.A.E.*, B, vii, 49]. As a result of subsequent experiments it has been found that under conditions producing acute physiological disturbances, the tracheae and body walls of *Culex* are capable of both functions of respiration, *i.e.*, the absorption of oxygen and expiration of carbonic acid [*loc cit.* viii, 118].

Tsetse Fly Investigation.—*Jl. Dept. Agric., Union S. Africa, Pretoria*, i, no. 9, December 1920, p. 799.

Owing to the serious losses of stock from trypanosomiasis experienced by recent settlers, arrangements are being made for a special investigation of tsetse-flies [*Glossina* spp.] in the Empangeni area of Zululand.

The Union Government has agreed to support the plan suggested by the Imperial Government to have the bionomics of tsetse-flies studied on common lines by special entomologists stationed in suitable localities in six widely separated fly belts. It is proposed that the work of the various stations should be co-ordinated through the Imperial Bureau of Entomology, London, and each station should be kept informed of the progress made at the others. These investigations are expected to extend over five years. The Union Government has undertaken to carry out investigations according to this plan in Zululand at its sole expense, besides contributing annually to the common fund for general purposes.

BRITTEN (H.). **Siphonaptera. Records in the Counties of Cumberland, Westmorland, Lancashire and Cheshire.**—*Lancashire and Cheshire Naturalist, Manchester,* xii, no. 5–6, November–December 1920, pp. 100–105.

The species dealt with include: *Pulex irritans,* L., on dogs, badger and fox; *Archaeopsylla erinacei,* Bch., on hedgehogs; *Spilopsyllus cuniculi,* Dale, on rabbits, hares and small carnivora, and from a starling's nest; *Ceratophyllus gallinulae,* Dale, abundant in robins' and blackbirds' nests; *C. styx,* Roths., from nests of sand-martins and the dipper; *C. hirundinis,* Curt., in nests of house-martin; *C. garei,* Roths., abundant in nests of hawks and other birds; *C. gallinae,* Schr., abundant on poultry and other birds; *C. fringillae,* Wlk., found in sparrows' nests and nests of carrion crow; *C. fasciatus,* Bosc, found chiefly on small animals such as moles, rats, etc.; *C. sciurorum,* Schr., found in nests of squirrels and dormice; *C. penicilliger,* Grube, chiefly on voles; *C. walkeri,* Roths., in voles' and moles' nests; *C. mustelae,* Dale, on voles, mice and stoats; *Ctenophthalmus agyrtes,* Hell., on nearly all small animals; *Rhadinopsylla pentacanthus,* Roths., on stoat and weasel; *Doratopsylla dasycnemus,* Roths., on brown rats; *Palaeopsylla minor,* Dale, abundant on moles and other small animals; *Leptopsylla musculi,* Dug., abundant on house mice; *L. spectabilis,* Roths., on stoats; *Hystrichopsylla talpae,* Curt., abundant on moles; and *Ischnopsylla simplex,* Roths., and *I. hexactenus,* Kolen., on bats.

Tick Control.—*Jl. Jamaica Agric. Soc., Kingston,* xxiv, no. 9–11, September–November 1920, pp. 315–316.

A copy is given of "The Tick (Control and Eradication) Law, 1920." This law empowers the Governor in Privy Council to issue orders for the treatment, by any means thought desirable, of cattle (including equines), and for the construction of dipping tanks; and to prohibit the removal of cattle from any given area. The orders may refer to the whole Island or any part of it.

As a general rule tanks are to be paid for by the owner of the holding on which they are made, and rented by the occupier at 10 per cent. of the cost, or alternatively paid for by the occupier, the cost being refunded by the owner if the latter is bound by the law to construct the tank.

Officials may be appointed to inspect cattle and to see that the provisions of the law are being carried out.

Provision is also made for the construction of public dipping tanks, and for declaring, with the consent of the owner, a private dipping tank to be public. Fixed charges are paid by the owners of cattle that are dipped in a public dipping tank.

LITTLE (A.). **The Fowl Tick** (*Argas persicus*).—*Rhodesia Agric. Jl., Salisbury,* xvii, no. 6, December 1920, pp. 542–545.

The bulk of the information given here on *Argas persicus* has already been noticed [*R. A. E.*, B, vii, 95].

SANBORN (C. E.). **The Chicken Sticktight Flea** (*Sarcopsylla gallinacea,* **Westw.**).—*Oklahoma Agric. Expt. Sta., Stillwater,* Bull. 130, February 1920, 8 pp., 4 figs. [Received 6th January 1921.]

The information contained in this revised bulletin [*R. A. E.*, B, viii, 84] on *Echidnophaga (Sarcopsylla) gallinacea,* Westw., has been noticed elsewhere [*R. A. E.*, B, iii, 148, 232; iv, 35].

McCULLOCH (I.). *Crithidia euryophthalmi,* **sp. nov., from the Hemipteran bug,** *Euryophthalmus convivus,* **Stål.**—*Univ. California Pubns. Zool., Berkeley,* xviii, no. 5, 29th December 1917, pp. 78–88, 35 figs. [Received 6th January 1921.]

The flagellate, *Crithidia euryophthalmi,* sp. n., is described from the digestive tract of *Euryophthalmus convivus* found in large numbers in late summer and early autumn feeding upon *Lupinus arboreus* on sand dunes at San Francisco. This flagellate is compared with *C. leptocoridis,* parasitic in *Leptocoris trivittatus.* The life-cycle and morphology of *C. euryophthalmi* in *E. convivus* are described.

PLATH (O. E.). **A Muscid Larva of the San Francisco Bay Region which sucks the Blood of Nestling Birds.**—*Univ. California Pubns. Zool., Berkeley,* xix, no. 5, 7th February 1919, pp. 191–200. [Received 6th January 1921.]

The injury done to nestling birds by the larvae of *Phormia* (*Protocalliphora*) *azurea,* Fall., and *P. chrysorrhea,* Meig., is discussed, and earlier records of parasitism by fly larvae are quoted. It is estimated that from 5 to 10 per cent. of parasitised nestlings die from loss of blood, and that some of those that do become full-fledged are so weakened that they fall an easy prey to their enemies. The subject has been more fully dealt with in a subsequent paper [*R. A. E.*, B, viii, 68].

McCULLOCH (I.). **A Comparison of the Life Cycle of** *Crithidia* **with that of** *Trypanosoma* **in the Invertebrate Host.**—*Univ. California Pubns. Zool., Berkeley,* xix, no. 4, 4th October 1919, pp. 135–190, 5 plates, 3 figs. [Received 6th January 1921.]

Among the conclusions arrived at in this paper are:—The crithidial flagellates of the life-cycle of *Trypanosoma* are structurally like those of the life-cycle of *Crithidia.* From the viewpoint of comparative morphology the differences existing between the crithidial forms of *C. euryophthalmi* and the crithidial forms of *T. lewisi* are less marked than are the differences between similar stages of *T. lewisi* and *Trypanosoma* (*Schizotrypanum*) *cruzi.*

Using the life-cycle of *T. lewisi* as a standard for comparison of the life-cycle of a haemoflagellate or a trypanosome, and the life-cycle of *C. euryophthalmi* as the standard of the life-cycle of a more primitive crithidial flagellate, there are more parallel stages and phases in these two life-cycles than exist between the life-cycle of any trypanosome and the life-cycle of any herpetomonad, or of any leptomonad now known. Furthermore, the close correlation between the two life-cycles of *T. lewisi* and *C. euryophthalmi* affords new evidence that the evolution of a trypanosome has probably taken place from a crithidial flagellate rather than from a herpetomonad or leptomonad flagellate.

The process of multiple fission by endogenous budding in the life-cycle of *C. euryophthalmi* tends not only to establish another link in common between the life-cycles of *Trypanosoma* (*e.g.*, *T. gambiense*) and the life-cycle of *Crithidia*, but also to link the life-cycle of *Crithidia* more closely to the lower protozoan forms that contain numerous *Leishmania*-like bodies in their life-cycles.

Blanc (G.). **Recherches sur les Maladies à Spirochètes du Rat transmissibles au Cobaye.**—*Arch. Inst. Pasteur, Tunis,* xi, no. 4, December 1920, pp. 229–237, 1 fig.

Further work in connection with the virus of infective jaundice in rats at Tunis [*R. A. E.*, B, vii, 153] was carried out in 1919.

It was found that the rats are infected at all seasons of the year and in all their different refuges, though the infection is greater in the slaughter-houses and the harbour than in the town.

Experiments were made in insect transmission. Mosquitos infected from guinea-pigs are not virulent after 24 hours, and *Spirochaeta icterohaemorrhagiae* does not seem capable of development in *Culex pipiens.* Positive inoculations have shown that it exists for 24 hours in a mosquito, but disappears when the ingested blood is digested. *C. pipiens* may be therefore excluded as a carrier.

Léger (L.). **Moustiques de Camargue. Un Anophéline nouveau pour la Faune française, le** *Myzorhynchus sinensis,* **Weid.**—*C. R. Soc. Biol., Paris,* lxxxiii, no. 37, 18th December 1920, pp. 1609–1610.

The only Anophelines hitherto known in France are *Anopheles maculipennis,* Meig., *A. bifurcatus,* L., and *A. plumbeus,* Hal. In 1919 the author found *Anopheles hyrcanus,* Pall. (*Myzorhynchus sinensis,* Wied., var. *pseudopictus,* Grassi), in Camargue [the island lying between the two principal mouths of the Rhône]. This species, which, according to Grassi and Kinoshita, is easily infected with *Plasmodium vivax* (benign tertian malaria), does not appear to have been previously recorded from France. It occurs in the southern part of the island, in the uninhabited fresh-water swamp region, and was observed in August in some numbers.

It was found together with *Culex* spp. Towards the east, where canals and rice-fields occur, it is replaced by *A. maculipennis,* which is more abundant but less aggressive. Near dwellings and brackish water *Culex* spp., especially *Culex* (*Ochlerotatus*) *punctatus,* Meig., constantly attack man.

Ricardo (G.). **New Species of S. African Tabanidae (Diptera).**—*Ann. S. African Mus., London,* xvii, no. 6, 30th December 1920, pp. 527–530.

Metoponaplos, gen. n., is erected for *Pangonia parva,* Wlk., with which *P. directa,* Wlk., appears to be identical. It is redescribed from the Cape. *M. nigricans,* sp. n., from Cape Colony, *Silvius callosus,* sp. n., from Natal and *S. hirsutus,* sp. n., from the Cape are also described.

Howard (L. O.). **Report of the Entomologist.**—*U.S. Dept. Agric., Bur. Ent., Washington, D.C.,* 7th September 1920, pp. 28–31.

Screw worms [*Cochliomyia macellaria*] are estimated to cause an annual loss of about £800,000 in the United States, and another heavy loss is due to wool-maggots of sheep. Remedial measures that are being tried consist of burning of carcasses, trapping and poisoning of flies, modified range practices for prevention of attack, and the development of a satisfactory larvicide and repellent for use on wounds. A useful bait for blow-flies is gut slime, a product of meat-packing houses, and it has been found that this can be dried and concentrated for distribution. Other pests of animals dealt with are horseflies, ox warbles [*Hypoderma*], and poultry parasites, including a mite *Liponyssus sylviarum,* which has not previously been known as a poultry pest. A study has been made of insect carriers of hog cholera, the house-fly [*Musca domestica*] and stable-fly [*Stomoxys calcitrans*] both being implicated. Studies on the insects affecting the health of man were largely concerned with anti-Anopheline work, and with house-flies. Some experiments were carried out with substances for controlling insects breeding in human excreta ; while these are not completed, great promise has been shown by potassium cyanide solution, sodium arsenate, and a pine-tar product acid.

Watson (J. R.). **Controlling Poultry Lice.**—*Florida Agric. Expt. Sta., Gainesville,* Press Bull. 315, 13th December 1919, 2 pp. [Received 7th January 1921.]

The remedies here recommended against poultry lice are sodium fluoride powder, mercurial ointment and vaseline, and a powder made by mixing two parts gasolene and one part carbolic acid with plaster of paris.

Dyar (H. G.). **The *Aëdes* of the Mountains of California and Oregon.**—*Insecutor Inscitiae Menstruus, Washington, D.C.,* viii, no. 10–12, October–December 1920, pp. 165–173.

Further observations are given on the peculiar mosquito fauna of the Californian mountains. To the species already noticed [*R. A.E.,* B, v, 5 ; vi, 48] a new species or variety, *Aëdes masamae,* is added. No males were obtained, so that its exact position cannot be stated.

Dyar (H. G.). **A new *Culex* from Panama.**—*Insecutor Inscitiae Menstruus, Washington, D.C.,* viii, no. 10–12, October-December 1920, pp. 173–174.

Culex (*Choeroporpa*) *psatharus,* sp. n., is described from two males taken on screens at Colon.

Dyar (H. G.). **Note on** *Aëdes fulvus,* **Wiedemann.**—*Insecutor Inscitiae Menstruus, Washington, D.C.*, viii, no. 10–12, October–December 1920, pp. 174–175.

The male of this species is described from specimens taken on screens at Colon, Panama. Its structure is identical with that of *Aëdes bimaculatus,* Coq.

Dyar (H. G.). **A Collection of Mosquitoes from the Philippine Islands.**—*Insecutor Inscitiae Menstruus, Washington, D.C.*, viii, no. 10–12, October–December 1920, pp. 175–186.

The following new species are included in a collection of 32 species from Los Baños, Philippine Islands:—*Wyeomyia* (*Dodecamyia*) *mus,* bred from *Nepenthes*; *Hodgesia ampyx*; *Rachionotomyia monetifera*; *Culex hensemaeon*; *C. inelegans*; *C.* (*Neoculex*) *fidelis*; and *Mansonia* (*Coquillettidia*) *diaeretus.* A key to the 32 species is given.

Dyar (H. G.). **Note on the Distribution of the Flood-Mosquitoes of the West.**—*Insecutor Inscitiae Menstruus, Washington, D.C.*, viii, nos. 10–12, October–December 1920, pp. 198–199.

Aëdes aldrichi, D. & K., apparently breeds nowhere else but in flood-pools. Two other species, *A. vexans,* Meig., and *A. cinereus,* Meig., occur in flood-pools, although not breeding exclusively in them. All three species have been found in Washington, and the first two also in Oregon. It seems possible that *A. goninus,* D. & K., from Texas, is a flood-species allied to *A. aldrichi.*

Dyar (H. G.). **The Earliest Name for the Yellow Fever Mosquito (Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus, Washington, D.C.*, viii, nos. 10–12, October–December 1920, p. 204.

In 1916 Knab showed that the name *argenteus,* Poiret, was an earlier name for the yellow fever mosquito than *fasciata,* F. A still earlier name is *Culex aegypti,* L., dating from 1762. Edwards has suggested that the name *fasciata* should be retained, but the author does not think it necessary to make an exception to the usual rule; in cases of doubt the name *fasciata,* F., could be added in parentheses.

Ewing (H. E.). U.S. Bur. Ent. **New Predaceous and Parasitic Mites of the Superfamily Gamasoidea (Acar.).**—*Ent. News, Lancaster, Pa.*, xxxi, no. 10, December 1920, pp. 286–293.

Liponyssus setiger, from a short-tailed shrew in Wisconsin, and *L. bermudaensis,* from a wood rat in Bermuda, are among the new species described in this paper.

Hirst (S.). **On Three New Parasitic Mites** (*Leptus, Schöngastia* **and** *Demodex*).—*Ann. & Mag. Nat. Hist., London,* vii, no. 37, January 1921, pp. 37–39.

The new mites described are:—*Leptus* (*Trombicula ?*) *similis* and *Schöngastia americana,* from chickens in Texas, and *Demodex melesinus,* from a badger in Leicestershire.

The genus *Psoroptes*, Gerv., is discussed. Mégnin's specimens of *Psoroptes*, found on a buffalo from Cochin China living in the menagerie of the Paris Museum and determined by him as *P. communis*, are really referable to *P. natalensis*.

Apparently two species of *Psoroptes* are parasitic on cattle, as specimens referable to *P. communis* (var. *bovis*) have been found on cattle in South Africa.

Edwards (F. W.). **New Species of Palaearctic Simuliidae in the British Museum (Diptera, Nematocera)**—*Ann. & Mag. Nat. Hist., London*, vii, no. 37, January 1921, pp. 141–143.

The new species are :—*Simulium* (*Prosimulium*) *gallii*, from Switzerland ; *S.* (*P.*) *fulvipes*, from Bulgaria ; and *S. gracilipes*, from Morocco. The last-named was taken on a mule.

Malaria Control. Control of Yellow Fever.—*6th Ann. Rept. 1919, Internat. Health Bd., Rockefeller Foundation, New York*, January 1920, pp. 148–157, 158–165. [Received 15th January 1921.]

The work of the International Health Board against malaria in the United States and yellow fever in Central and South America is here reviewed.

Weiss (A.). **Un Pulicide (Aphaniptère) nouveau de l'Afrique mineure** *Archaeopsylla polymorphus*, **n. sp.**—*Bull. Soc. Hist. Nat. Afr. Nord, Algiers*, xi, no. 9, 15th December 1920, pp. 171–176, 4 figs.

Archaeopsylla polymorphus, sp. n., from a hedgehog (*Erinaceus algirus*) in Tunisia, is described.

Martini (E.). *Anopheles* **in Niedersachsen und die Malariagefahr.** [*Anopheles* in Lower Saxony and the Danger of Malaria.]—*Hygienisch. Rundschau* [*sine loco*], no. 22, 1920, pp. 673–677.

Martini (E.). **Neuere, zur Beurteilung der Malaria- und Anophelesverhältnisse in Deutschland wichtige Literatur.** [Recent Literature important for estimating the Malaria and Anopheline Conditions in Germany.]—*Ibidem*, no. 24, 1920, pp. 737–742.

The information given in the first paper concerning the Anophelines in the region between Bremen and Kiel is substantially that already noticed [*R. A.E.*, B, viii, 213].

The second article is complementary to the first, and contains a list of 108 references to papers published since 1898.

HELLER (K. M.). **Ein neuer, im Neste der Kammratte** (*Ctenomys*) **lebender Rüsselkäfer aus Argentinien.** [A new Curculionid living in the Nest of *Ctenomys* in Argentina.]—*Ent. Blätter, Berlin*, xvi, no. 10–12, 28th December 1920, pp. 239–241.

Ctenomyophila bruchiana, gen. et sp. n., of which the larvae and adults are found in thousands in the nests of a rodent, *Ctenomys talarum*, in Argentina, is described.

PATTON (W. S.). **Cutaneous Myiasis in Man and Animals in India.**—*Ind. Med. Gaz., Calcutta*, lv, no. 12, December 1920, pp. 455–456.

Breeding experiments in connection with more than 120 cases of cutaneous myiasis in man and animals show that the fly concerned was *Chrysomyia bezziana*, Vill., a species that has so far only been recorded from Africa, where its larvae have been found in the larger animals. In India there can be little doubt that it is the chief Calliphorine causing myiasis, and its larvae occur in man as commonly as in animals.

The female fly lays its eggs on or in living tissues only, being attracted by foul discharges. A mass of eggs was found in one case on a piece of lint attached to an ulcer on the leg of a patient. The larvae die if placed in the body of a recently dead or decomposing animal, in which situation those of most blowflies flourish. They burrow into the tissues, causing much destruction, and are secured from falling out by their many backwardly-directed spines. The adult flies have never been seen in nature.

This fly is a serious pest to man and animals in India, and the author is desirous of receiving as many specimens from cases as possible.

Other larvae that have been received from cases of cutaneous myiasis in animals are those of *Lucilia argyrocephala*, Macq. (*serenissima*, F.), *Chrysomyia dux*, Esch., *Aphiochaeta xanthina*, Speis. (*ferruginea*, Brun.), and *A. rufipes*, Mg. ; the last two also attack man. The larvae of *Philaematomyia crassirostris*, Stein, and of *Sarcophaga* were received from a case of intestinal myiasis in man, and the latter also from two cases of cutaneous myiasis in man. Fuller accounts of *Chrysomyia bezziana* and cutaneous myiasis, and of *Aphiochaeta xanthina*, will be published later.

SHIRCORE (J. O.). **[Traps for Glossina ; Correspondence.]**—*Trans. R. Soc. Trop. Med. & Hyg., London*, xiv, no. 2, 18th June 1920, p. 30.

With reference to the use of artificial shelters as breeding places for *Glossina*, mentioned by Carpenter [*R. A.E.*, B, viii, 100], it is suggested that logs smeared with some adhesive substance and propped on supports two or three inches off the ground might act as traps for the flies. It is also suggested that the sand in the shelter be mixed with a poisonous chemical, but whether this would prevent the emergence of the adults has not yet been ascertained.

Report of Glossina Sub-Committee of the Imperial Bureau of Entomology.—*Trans. R. Soc. Trop. Med. & Hyg., London,* xiv, no. 4, 19th November 1920, pp. 59–62.

Attention is drawn in this report to the necessity for further knowledge of the life-histories of *Glossina* spp., as well as their habits and the factors that favour their increase or inhibit their spread, before the wide areas over which they range can be reduced. The measures hitherto recommended for the eradication of tsetse-flies cannot be effectively carried out over large stretches of country, and will only prove useful in restricted portions of such areas if persistently maintained over a considerable time.

An essential line of investigation will be a thorough survey in each infested locality. The surveys will require checking at intervals throughout the year, and should include estimates, on a standard basis, of the density of the fly. The points suggested for observation and experiments are distribution of the flies, effects of clearing, breeding-grounds, food of the flies, their parasites and other enemies, destruction of adults, and influence of odours. Zululand, Southern Rhodesia, Nyasaland, Tanganyika Territory, the Sudan and Northern Nigeria, are suggested as the most suitable countries for the establishment of experimental stations to investigate these problems. The precise areas selected in these countries should represent different types of environment, and should, as far as possible, be situated in localities in which the presence of tsetse-flies is actually obstructing settlement or is likely to do so in the near future. Suggestions are made for the organisation of the staff for these stations, which, as the work progresses, will necessarily include a protozoologist.

Yorke (W.). **Research into the Trypanosomiasis Problem: a Critical Consideration of Suggested Measures.**—*Trans. R. Soc. Trop. Med. & Hyg., London,* xiv, nos. 3 and 4, 15th October and 19th November 1920, pp. 31–47 and 49–59.

The recommendations in the foregoing report are criticised mainly on the ground that they deal only with the entomological aspects of the problem. The reading of the paper led to a considerable amount of discussion of a controversial nature.

Buxton (P. A.). **The Capitulum of** *Psoroptes* **(Acarina).**—*Parasitology, Cambridge,* xii, no. 4, December 1920, pp. 334–336, 2 figs.

This account of the capitulum and mouth-parts of *Psoroptes* has been prepared as a preliminary to investigations that are being made upon the bionomics of the itch mites. The material used has been identified as *Psoroptes equi*, but it is considered probable that nearly all the forms of *Psoroptes* occurring on domestic animals are merely races or varieties of a single species.

Basile (C.). *Leishmania, Herpetomonas,* **and** *Crithidia* **in Fleas.**—*Parasitology, Cambridge,* xii, no. 4, December 1920, pp. 366–377, 2 plates.

In the intestines of various insects, and of fleas in particular, certain Protozoa of the herpetomonad and crithidial types have been observed. Their relationship to *Leishmania* is here considered. Though in some stages *Leishmania* presents morphological characteristics almost identical with *Herpetomonas*, it has been distinguished by the fact that *Herpetomonas* undergoes its complete developmental cycle (flagellate and non-flagellate) in the intestines of insects, while *Leishmania* completes its cycle in two hosts, one a vertebrate and the other an invertebrate. In the vertebrate host it produces a disease with characteristic symptoms—leishmaniasis.

Leishmania is non-flagellate in the vertebrate host and flagellate in the invertebrate (*Ctenocephalus canis*, *Pulex irritans*). Both forms occur in artificial cultures. Three stages (which may also be noticed in *Herpetomonas* and *Crithidia*) are found in the life-cycle of *Leishmania* in fleas—the pre-flagellate, occurring in the flea's mid-gut, the flagellate in the hind-gut, and the post-flagellate in the rectum and faeces.

In *Leishmania*, as opposed to *Herpetomonas* and *Crithidia*, the flagellate form does not seem to be easily found. The post-flagellate forms, expelled with the faeces, help to spread the species through infection *per os* of other fleas, and perhaps also of other insects. Probably, too, children or dogs might be infected in this way, as well as by inoculation. This would explain not only the widespread distribution of leishmaniasis in dogs, but also the domestic localisation of the disease, members of the same family becoming infected by fleas, which themselves infect one another by means of the faeces.

An accurate study of the complete developmental cycle of the various *Herpetomonas* and *Crithidia* already described in fleas reveals certain morphological differences between them and the developmental forms of *Leishmania* in the same insects; on the other hand, the morphological study, if it is not supplemented by biological and experimental data, may be sometimes insufficient. It is necessary to bear in mind that the herpetomonad and crithidial forms found in fleas are not always insectan flagellates, since developmental stages of trypanosomes (*e.g.*, *Trypanosoma lewisi*) that possess a herpetomonad or crithidial phase also occur in fleas.

Experiments and observations of natural disease occurrence [*R. A.E.*, B, i, 130; iv, 102; etc.] show that in mammals, as in reptiles fishes and amphibia (especially in those that are insectivorous), natural herpetomoniases exist, or an infection with an insectan *Herpetomonas* may be induced, either by way of the digestive tract or by inoculation. Herpetomoniasis appears to be an infection that is not distinguishable, either by the morphological and biological characteristics of the parasite or by its symptoms, from visceral leishmaniasis. The author consequently reaffirms his belief that the leishmaniases are produced by Protozoa (*Herpetomonas*, and perhaps also *Crithidia*) that have adapted themselves to live and multiply in vertebrate hosts; this adaptation is easier in the case of a vertebrate on which the insect hosts are ectoparasitic.

The same species of *Herpetomonas* of insects, under different conditions, may not have any pathogenic action, or may produce pathogenic effects in various degrees in different animal hosts. In Mediterranean leishmaniasis this theory explains the acute forms, the chronic forms, and other spontaneously curable forms that have been distinguished. The disease, and particularly slight cases of it, may be much more frequent than has yet been realised.

The study of visceral leishmaniasis in the Mediterranean regions, the epidemiological factors of the close relations between leishmaniasis in children and in dogs, and the close relations of contact between children and dogs affected with leishmaniasis and fleas affected with parasitic Protozoa that are morphologically and biologically indistinguishable from *Leishmania*, tend to prove that visceral leishmaniasis of the Mediterranean is produced by a species of *Herpetomonas* of *Pulex irritans* and *Ctenocephalus canis* that has adapted itself to live in children and dogs, themselves the habitual hosts of these fleas.

CARTER (H. F.). **Descriptions of the Adult, Larval, and Pupal Stages of a New Mosquito from Lord Howe Island, S. Pacific.**—*Proc. Zool. Soc., London*, 1920, pt. 4, December 1920 pp. 623-628, 3 figs.

Larvae and pupae of *Ochlerotatus laurei*, sp. n., here described, were taken from a hollow in a fallen tree-trunk containing water. Adults of another species of *Ochlerotatus* were taken in a dwelling-house at night.

PARKINSON (W. H.) & BELL (H. D.). **Insect Life on Sewage Filters.**—*London*, The Sanitary Publishing Co., Ltd., 1919, viii+64 pp., 8 figs. [Price 3*s*.] [Received 24th February 1921.]

This useful work deals with a Collembolan, *Achorutes viaticus*, L.

In 1910 the junior author found this springtail (then erroneously called *Podura aquatica*) playing an important part in sewage purification at the Corporation Sewage Works, Stratford-on-Avon, where "ponding" has since been entirely eliminated as a result of its presence. Sewage filters containing this Podurid maintain high nitrates, and produce high percentage purification of the tank effluent. The conclusion drawn from experiments, a description of which forms the major portion of this little volume, is that *A. viaticus* does contribute to the production of ammonia and carbon dioxide, either by passing air upward through a liquid containing sewage, as in the "activated sludge" process, or by its action on growths deposited by tank effluent in sewage filters.

A description of this species, its habits, distribution, food, and classification, is taken from Wilson and Johnson's work, "Organisms Found in Sewage Filters." *A. viaticus* measures about 2 mm. in length. About 9,000 weigh 1 gramme, or 4,000,000 to the lb. Though the name *Achorutes* ("not dancing") suggests lack of activity, this species can show considerable vigour, especially in warm weather. It occurs generally in connection with decaying animal or vegetable matter, and has been recorded from Norway, Siberia, Denmark, Britain, Greenland, South America, and in islands south of New Zealand. It has appeared spontaneously at various sewage works in Great Britain, and has been introduced on others. Its chief food is the colloidal growths that separate out from sewage on any rough surface. It also feeds on the larvae of *Psychoda*, a sewage fly that is a serious nuisance at some works [*cf*. *R. A. E.*, B, vii, 24, 90].

It is not yet possible to state why *A. viaticus* abounds on some sewage works and is absent on others.

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COTTERELL (G. S.). **The Life-history and Habits of the Yellow Dung fly** (*Scatophaga stercoraria*) : **a possible Blow-fly Check.**—*Proc. Zool. Soc., London,* 1920, pt. 4, December 1920, pp. 629-647, 14 figs.

In a preface to this paper Prof. Lefroy states that *Scatophaga stercoraria* preys on a large number of Diptera, especially *Calliphora* and *Musca*. [According to Major E. E. Austen, D.S.O., the statement that *Scutophaga* normally attacks such large flies as *Calliphora* is open to serious doubt.—Ed.]

The author describes the various stages of this fly. It is widely distributed, both in temperate and sub-tropical countries, having been recorded as far north as Nova Zemblya and Siberia, and as far south as the Canary Islands and South Africa, but apparently is not known from India or Australia.

The eggs are laid over the surface of excrement, in batches of from 10 to 80, and each female lays from 100 to 150 eggs. Although any excrement will serve as a breeding medium, sheep and cattle dung is preferred for oviposition. The eggs hatch in from one to two days, according to the temperature. There are three larval instars, the total larval life lasting on an average 11 days, but this is governed by the temperature and condition of breeding medium, the minimum time observed being 8 days and the maximum 14 days. The pupal stage lasts from 10 to 17 days, with a minimum of 6 and a maximum of 18 days. The minimum period from adult to adult was 17 days, and the maximum 31 days, with an average of 24 days. The life-cycle from egg to egg takes from six to seven weeks. There are probably five broods a year. Breeding continues from April to October. No definite information has yet been obtained with regard to hibernation, which probably takes place in the adult stage. In the field the fly that is mainly attacked appears to be *Borborus equinus,* but it is probable that all Diptera are preyed upon except Syrphids and Stratiomyids, which are too active on the wing. Its method of attacking its prey is described. The only natural enemy observed was an unidentified Ichneumonid.

LASSALLE (C. F.). **Report on an** *Anopheles* **Survey of the Colony of Trinidad and Tobago.**—*Council Papers nos. 89 and 129 of 1920, Port of Spain,* 1920, 218 pp., 5 charts, 2 maps.

The mosquito surveys of various districts of the Colony of Trinidad and Tobago, begun in March 1914, had to be temporarily suspended, and were only resumed in July 1917. The work is now completed, and the reports from each district are given. The breeding areas are described. The remedial measures advocated are based on the measures adopted in the Panama Canal Zone. It may be impossible to eradicate every breeding place throughout the colony, but those within and for a certain distance around all towns, villages, estates and other centres of population should be effectively dealt with.

In the second part of this report lists of mosquito breeding places are given, arranged under the various districts. A complete list of the Trinidad mosquitos is also appended [*R. A. E.*, B, v, 59, 60].

BRUNETTI (E.). **Catalogue of Oriental and South Asiatic Nemocera** *Rec. Ind. Mus., Calcutta,* xvii, June 1920, 300 pp. [Received 28th January 1921.]

Mosquitos include a large portion of the species in this catalogue, which incorporates all available names up to about the middle of 1919.

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Muraz (—). **Foyer de Trypanosomiase humaine à Tchoa (Territoire du Tchad).** [A Centre of Human Trypanosomiasis at Choa.]—*Bull. Soc. Path. Exot., Paris,* xiii, no. 10, 8th December 1920, pp. 789–791.

A centre of intense infection of sleeping sickness has been found at Choa, in the Lake Chad region, *Glossina palpalis* being found in great numbers by the author. According to local reports there were 283 deaths from the disease in 1919–1920.

Aldigé (E.). **Trypanosomiase du Porc en Guinée Française.**—*Bull. Soc. Path. Exot., Paris,* xiii, no. 10, 8th December 1920, pp. 792–796.

Trypanosomiasis of pigs was recorded in French Guinea in 1906, the parasite being identified as *Trypanosoma dimorphon.* In September 1914 the author studied an epidemic of trypanosomiasis in a piggery at Mamou, but it was obvious that the parasite causing the disease was neither *T. dimorphon* nor *T. cazalboui,* but much more closely resembled *T. pecaudi.* It may be a form allied to *T. brucei,* which, although not known to occur in French Guinea, is closely allied to *T. togolense,* occurring in Togoland. The only chronic case among the infected pigs was a sow that had been imported two months previously from a locality where *T. pecaudi* is commonly found in various animals, and it is probable that the epidemic arose from this source.

Laveran (A.) & Franchini (G.). **Contribution à l'Etude de la Flagellose des Euphorbes.** [Contribution to the Study of Flagellosis of *Euphorbia.*]—*Bull. Soc. Path. Exot., Paris,* xiii, no. 10, 8th December 1920, pp. 796–800.

As a result of investigations recorded in this paper, the conclusion is reached that the presence of flagellates in spurge (*Euphorbia* spp.) is not rare in Italy, especially at Bologna, where they have been found in five species. Inoculations into both *E. pilosa* and *E. sauliana* with cultures of *Herpetomonas ctenocephali* var. *chattoni* gave positive results, and white mice inoculated in the peritoneum with the latex of an infected plant of *E. nereifolia* showed slight infections.

Pringault (E.). **Les Phlébotomes dans la Région Marseillaise.**—*Bull. Soc. Path. Exot., Paris,* xiii, no. 10, 8th December 1920, pp. 809–810.

In October 1918 the presence of *Phlebotomus papatasii,* Scop., was recorded at Miramas. In 1920 observations were made in the vicinity of Marseilles, with the result that between 15th July and 29th September 196 individuals were captured, the species including *P. minutus,* Rond., *P. sergenti,* Parrot, and *P. perniciosus,* Newst. No individuals of *P. papatasii* were found. The midges were numerous on 15th July, but after 13th September they had all disappeared. They were found in rooms about an hour after sundown.

Ouzilleau (F.). **Enquête sur la Trypanosomiase au Moyen Oubangui (Ibenga-Motaba) en 1914.**—*Bull. Soc. Path. Exot., Paris,* xiii, no. 10, 8th December 1920, pp. 817–829.

The results are recorded of an investigation into the occurrence of sleeping sickness in the territory of Ibenga-Motaba, in the Ubangi district of French Equatorial Africa in 1914. The situation in various localities of this district is described. The whole review occupied three months, and in the course of the campaign 20,000 natives were visited, 15.2 per cent. being found infected.

Clapier (P.). **Enquête démographique et Etat actuel de la Trypanosomiase au Pays Bangala (Af. Eq. Fr.).**—*Bull. Soc. Path. Exot., Paris,* xiii, no. 10, 8th December 1920, pp. 830–847.

The Bangala tribes on the French banks of the Ubangi and Congo Rivers are rapidly dying out. *Glossina palpalis* is abundant all the year round ; Bangala is considered to be one of the oldest *foci* of sleeping sickness, and deaths from the disease are very numerous at the present day. While this is not the sole cause of the decreasing population, a rapidly declining birthrate, the use of drugs, and the employment of slaves for all physical work being contributory causes, trypanosomiasis undoubtedly takes a large toll of the population ; in a given time there are fewer births than cases of infant mortality from the disease. It is estimated that in a quarter of a century the race will have ceased to exist. While prophylaxis will protect the individual, it cannot save the race in this district, and the situation is a good example of the urgent necessity for perseverance in prophylactic measures in any region that is threatened with a similar fate.

Rodhain (J.). **Observations diverses concernant** *Onchocerca volvulus.*—*Bull. Soc. Path. Exot., Paris,* xiii, no. 10, 8th December 1920, pp. 848–858.

From personal observation in the Belgian Congo the author describes the general distribution of human onchocerciasis in the Belgian part of the Congo basin, the local reactionary phenomena exhibited by filarial nodules, the localisation of fibromatic nodules and their histology, and finally a case of filarial tumour in a European, caused by *Onchocerca volvulus. Microfilaria perstans* was also found in the blood of this patient. The case was that of a Belgian who had for many years resided during long periods in Africa, and who had carried the cyst for seven years without any local discomfort.

Bertarelli (E.). **Tentativo di Trasmissione della Malaria al Macaco.** [An Attempt to Transmit Malaria to a *Macacus.*]—*Ann. d'Igiene,* Rome, xxx, no. 11, November 1920, pp. 689–690. [Received 21st January 1921.]

With reference to Mesnil and Roubaud's experiments in inoculating chimpanzees with *Plasmodium vivax* [*R. A.E.,* B, viii, 217], an account is given of a similar attempt with *Macacus cynomolgus,* the blood used being taken from a case of typical tertian malaria with gametes. Some of the parasites were near sporulation, and there were a few gametic forms also. The experiment proved negative.

Piras (L.). **Anofelismo senza Malaria.** [Anophelism without Malaria.]—*L'Igiene Moderna,* 1920, p. 1. (Abstract in *Ann. d'Igiene, Rome,* xxx, no. 11, November 1920, p. 714.) [Received 21st January 1921.]

This is a study of the question of the revival of an epidemic of malaria in consequence of the return of infected troops to malarial districts, or to districts where malaria has been absent for a long time, though a few Anophelines are still present. The work was done in the province of Genoa.

The following conclusions are reached :—The most probable causes of the disappearance of malaria in some localities of Genoa between 1885 and 1890 are the reduction in the number of Anophelines, owing to sanitation work on a small scale, and to changes in methods of cultivation. In the Genoese localities that were malarial and where Anophelines are still present, the introduction of human cases has not led to an epidemic owing to the lack of the necessary number of mosquitos. The sole exception is the commune of Vezzano Ligure, where malaria will disappear as soon as the number of Anophelines is reduced. There is therefore no reason to fear an increase of malaria in consequence of the return of soldiers infected with malaria.

Schumacher (F.). *Holcocranum saturejae,* **Kol. (Hemipt.) im Neste der Beutelmeise.** [*H. saturejae* in the Nest of *Parus pendulinus.*] —*Zeitschr. wiss. Insektenbiol., Berlin,* xvi, no. 3–4, 31st December 1920, pp. 74–75.

A Lygaeid bug, *Holcocranum saturejae,* Kol., is recorded from a nest of *Parus pendulinus* from the Volga. Development must have occurred in the nest, as larvae were found as well as adults. It is considered probable that, as the bug is common on the banks of streams and near marshes in situations where *P. pendulinus* nests, the infestation was accidental, and not a case of true parasitism.

Reye(—). **Milben in den Fäces der Menschen.** [Mites in Human Excreta.]—*Deutsche Med. Wochenschr.,* no. 37, 11th September 1919, p. 1026. (Abstract in *Arch. Schiffs- u. Trop.-Hyg., Leipsic,* xxiv (1920), no. 12, January 1921, p. 385.)

Tieche (1910) believed that mites could temporarily occur as internal parasites in the human intestine, and Tsunoda (1910) thought, from the large number of mites observed by him in human faeces,and from the presence of their eggs, that they had lived in the intestine and were capable of reproduction there. The author has found Tyroglyphid mites and their eggs in many kinds of dried food-stuffs, and concludes that the individuals found in human excreta are harmless.

Westphalen (—). **Milben in den Fäces der Menschen.** [Mites in Human Excreta.]—*Deutsche Med. Wochenschr.,* no. 48, 27th November 1919, p. 1333. (Abstract in *Arch. Schiffs- u. Trop.-Hyg., Leipsic,* xxiv (1920), no. 12, January 1921, p. 385.)

With reference to the foregoing paper, it is mentioned that in a case of chronic diarrhoea, periodically aggravated, mites, probably Tyroglyphids, were occasionally evacuated, apparently at times coinciding with the increase of severity. As this occurred even when a well-regulated sanatorium diet was given, introduction with the food seems excluded and an increase of the mites in the intestine appears probable. The case was finally cured.

ROTHSCHILD (N. C.). **The Generic Name of the Sand-flea.**—*Ectoparasites, London,* i, no. 3, 15th January 1921, pp. 129–130.

Attention is drawn to the fact that Jarocki in 1838 proposed the generic name *Tunga* for the chigger. This name is a year older than *Dermatophilus,* and has two years' priority over *Sarcopsylla*; it must therefore be employed, the correct name being *Tunga penetrans,* L.

JORDAN (K.) & ROTHSCHILD (N. C.). **A New Species of Sarcopsyllidae.**—*Ectoparasites, London,* i, no. 3, 15th January 1921, pp. 131–132, 2 figs.

Tunga caecigena, sp. n., is described from China, where it was found in the ears of sewer rats.

JORDAN (K.) & ROTHSCHILD (N. C.). **Four New Palaearctic** *Ctenophthalmus.*—*Ectoparasites, London,* i, no. 3, 15th January 1921, pp. 133–137, 6 figs.

The new species described are *Ctenophthalmus apertus,* taken on *Apodemus sylvaticus* and other hosts in France; *C. pisticus,* on *Eutamias asiaticus,* in Siberia; *C. vicarius,* on *Talpa europaea,* in Rumania; and *C. savii,* on *Pitymys savii* and other mice, in Italy.

JORDAN (K.) & ROTHSCHILD (N. C.). **Two New Palaearctic Siphonaptera.**—*Ectoparasites, London,* i, no. 3, 15th January 1921, pp. 138–140, 3 figs.

Rhadinopsylla integella, sp. n., is described from France, on *Microtus* sp.; and *Palaeopsylla iberica,* sp. n., from Spain, on *Talpa* and *Microtus ibericus.*

JORDAN (K.) & ROTHSCHILD (N. C.). **New Genera and Species of Bat-fleas.**—*Ectoparasites, London,* i, no. 3, 15th January 1921, pp. 142–162, 37 figs.

The new bat-fleas here described include:—*Ischnopsyllus comminus,* from Natal; *I. comans,* from Pekin; *Rhinolophopsylla capensis,* from Zululand; *Myodopsylla gentilis,* from British Columbia; *Lagaropsylla micula,* gen. et sp. n., and *L. putilla,* from India; *L. mera,* from Java; and *Ptilopsylla leptina,* gen. et sp. n., from Paraguay. The new genera *Araeopsylla, Hormopsylla* and *Sternopsylla* are also described.

JORDAN (K.) & ROTHSCHILD (N. C.). **Eight New Ceratophylli.**—*Ectoparasites, London,* i, no. 3, 15th January 1921, pp. 163–177, 17 figs.

The new species described are:—*Ceratophyllus fimbriatus,* on *Sciuropterus fimbriatus,* from North-west India; *C. lupatus,* on *Sciurus lateroides,* from the Nepal-Sikkim frontier; *C. hastatus,* on

Dremomys rufigenis, from N. Shan States ; *C. sincerus*, from Palestine ; *C. sucinus*, on *Mus musculus* and *Sorex* sp., from Rumania ; *C. sarinus*, on *Mus* sp., from Asia Minor ; *C. spadix*, from Burma ; and *C. apollinaris*, on *Mustela affinis*, from Colombia.

JORDAN (K.) & ROTHSCHILD (N. C.). **On** *Ceratophyllus fasciatus* **and some allied Indian Species of Fleas.**—*Ectoparasites, London*, i, no. 3, 15th January 1921, pp. 178–198, 30 figs.

In view of Clarke's inquiry concerning the distribution in the Oriental region of *Ceratophyllus fasciatus* and *Pulex irritans*, in connection with his hypothesis of the transmission of rheumatic fever [*R. A.E.*, B, viii, 75 ; ix, 38], an account is here given of the distribution of *C. fasciatus* and of its near Indian allies, often erroneously referred to as *C. fasciatus* in medical literature. *C. californicus*, Baker, and *C. oculatus*, Baker, are apparently synonymous with *C. fasciatus*.

The species dealt with include :—*C. tamilanus*, sp. n., on *Epimys* sp., from Ceylon ; *C. arcotus*, sp. n., on *Funambulus palmarum*, from Madras ; *C. nilgiriensis*, sp. n., on *Epimys rattus*, from Coonoor, also on mice and *Bandicota giganteus* from Ootacamund ; *C. argutus*, sp. n., on *Mus musculus* and *Funambulus palmarum*, from Dharwar ; *C. punensis*, sp. n., on *Funambulus* sp., from Poona ; *C. punjabensis*, sp. n., on *Epimys rattus*, from Amritsar ; and *C. simla*, sp. n., on *Epimys decumanus* and *Mus musculus*, from Simla.

The material in this collection is decidedly in favour of Clarke's contention that *C. fasciatus* does not occur in India at or near sea-level, but should some forms of *C. alladinis* play the same biological rôle as *C. fasciatus*, Clarke's argument loses its force.

Since the above was written the remarks concerning the occurrence of *C. fasciatus* in India must be modified, as a specimen has since been received from Bareilly, United Provinces, from a buffalo.

FERGUSON (E. W.) & HILL (G. F.). **Notes on Australian Tabanidae.**—*Proc. Linn. Soc. N.S.W., Sydney*, xlv, pt. 3, 27th October 1920, pp. 460–467.

Demoplatus nigrovittatus, sp. n., is described from New South Wales ; and the synonymy of a number of other Australian Tabanids is discussed. Two new names are necessary—*Tabanus neopalpalis* for *T. palpalis*, Tayl. (*nec* Ric.), and *T. minusculus* for *T. minor*, Tayl. (*nec* Macq.).

STARTZ (E.). **Preparation of a Crude Oil Emulsion Dip for dipping Cattle.**—*Montana Livestock Sanitary Bd., Helena*, i, no. 3, 1st January 1921, pp. 3–9.

General details are given about the physical condition of an emulsion, and the crude petroleum oil emulsion used for cattle-dipping is described. The formula decided upon was 4 lb. resin, 1½ lb. lye, 35 U.S. gals. crude oil, and water to make 100 U.S. gals. Resin and lye are used instead of ordinary soap, as with the latter, the emulsion is inclined to separate after a short time.

The lye is dissolved in about three U.S. gals. of water, the resin added, and the whole boiled until a clear dark brown solution is obtained. Into an empty barrel, holding 50 U.S. gals., two U.S. gals. of the oil are poured, then the hot resin and alkali solution, and the mixture is briskly agitated. After a short time it becomes thick, and finally assumes the consistency of a jelly. At this point more oil (one U.S. gal., or a little more) and about a quart of water are added, and the whole again thoroughly agitated. This is continued till all the oil and enough water to make 50 U.S. gals. of emulsion are incorporated. In this way a homogeneous 70 per cent. crude oil emulsion is obtained. This is emptied into the vat and the balance of water added later to make a 35 per cent. dipping fluid.

Water used in making soap dips should contain as little as possible of those mineral elements that constitute so-called hard waters. If necessary, precipitation of these elements (lime and magnesia salts) can be caused by the addition of a little lye and sodium carbonate; but moderately hard water offers no difficulty in making the dip.

A simple instrument for testing the amount of crude oil contained in the emulsion consists of a glass test-tube, the lower half of which is divided into two 5 cu. cm. spaces, above which are ten 1 cu. cm. divisions. To test the emulsion, 10 cu. cm. of it is put in the tube and 5 cu. cm. of denatured alcohol added, followed by 5 cu. cm. of 50 per cent. hydrochloric acid. When the tube is well shaken, and then gently tapped, the oil rises to the top. Each cubic centimetre of the oil thus separated represents approximately 10 per cent. of oil in the dip.

Even with a dip of 40 per cent. strength no ill effects, such as irritation and blistering, were observed, either in hot weather or cold (when, owing to the longer hair, more of the dip is carried off by the animals). This emulsion is easily made in hot or cold weather, and does not deteriorate even when kept in a cement vat for several days during a frost.

BUTLER (W. J.). **Directions for Dipping Cattle in Crude Oil Emulsions, with Plans for the Construction of Dipping Vat, Chutes and Corrals.** —*Montana Livestock Sanitary Bd., Helena,* i, no. 3, 1st January 1921, pp. 10–15, 4 figs.

The great advantage of the crude oil emulsion dip described above is that one dipping only is required, which does away with the necessity of holding or regathering cattle. In addition, the dip is not heated, and so is safer both in hot and cold weather. The cattle do not have to be held in it, and it does not have to be changed at intervals, but can be used as long as it is kept up to strength by adding more concentrated emulsion. The cost is less than that of any recognised dip where two dippings are required, but depends, of course, on the locality. Experience with over 22,000 cattle showed it to be quite effective against the scab mites and their eggs, and it will also kill ticks and lice. The cattle suffered no ill effects, such as blistering or stiffness.

Plans are given for the construction of a dipping vat, etc., so designed as to effect the utmost economy in fluid. A diagram is also given of an electric prod pole.

BACOT (A.). **On the Probable Identity of** *Rickettsia pediculi* **with** *Rickettsia quintana*.—*Brit. Med. Jl., London*, no. 3135, 29th January 1921, pp. 156–157, 1 chart.

During observations made in Warsaw in 1920, lice were found to be infected with *Rickettsia* bodies indistinguishable from *R. quintana*. The author contracted trench fever in the course of these investigations, although the disease was supposed to be non-existent in that region. The history of the illness is described. Lice that had previously proved free of *Rickettsia* infection, after being fed on the author showed the presence of *R. quintana*. It was found that trench-fever patients are capable of infecting lice with *R. quintana* for at least three months after cessation of febrile attacks or other obvious symptoms of the disease.

PIERCE (W. D.) & OTHERS. **Sanitary Entomology.**—*Boston, Mass.*, The Gorham Press, 1921, xxvi+518 pp., 28 plates, 88 figs. [Price $10.00.]

The field covered by the series of essays, written up from lectures, that comprise this useful work is more extended than that of an ordinary textbook. Disease transmission by insects is treated in its widest sense, so that, for example, non-blood-sucking flies are regarded as potential carriers of any bacterial or other disease in which the organism may be reached by the fly in any possible way. From the same point of view, the rôle that may belong to insects as intermediate hosts of certain parasitic worms, whose life-history is in many cases not fully known, is considered in detail.

As a result of this method of regarding the subject, many unworked or insufficiently worked problems are indicated and possible lines of research suggested. In the past a large part of the study of insect transmission of disease has aimed at proving or denying transmission by means of the bite of the insect, whereas the evidence here presented shows that a large proportion of the cases of insect transmission are not by the bite, but rather through contamination by the faeces. It may therefore be considered that many of the conclusions that insects are not involved in the transmission of certain diseases are unwarranted, and that such cases should be studied anew and more scientifically.

The book is not, however, only a stimulus to research, but also effectively covers the more obvious aspects of medical entomology, while insect diseases in animals also receive notice. In conclusion the information given is condensed into a valuable reference table showing the disease, the organism causing it, and how it is, or may be, transmitted by the insects concerned.

FROGGATT (J. L.). **A Study of the External Breathing-apparatus of the Larvae of some Muscoid Flies.**—*Proc. Linn. Soc. N.S.W., Sydney*, xliii, pt. 3, August–October 1918, pp. 658–667, 1 plate.

Dead or rotten larvae of flies may be identified by the spiracles, especially the posterior ones. Descriptions are given of those found in *Anastellorhina augur, Pollenia stygia, Chrysomyia* (*Pycnosoma*) *rufifacies, C. varipes, Lucilia sericata* and *Ophyra nigra*. The spiracles probably exercise an important function in the destruction of maggots by poison. The possibilities of this point are receiving further attention.

Dodd (A. P.). **Two new Hymenoptera of the Superfamily Proctotrypidae from Australia.**—*Proc. Linn. Soc. N.S.W., Sydney,* xlv, pt. 3, August–October 1920, pp. 443–446.

Hemilexomyia abrupta, gen. et sp. n., here described, is well established in New South Wales, where it has been bred from pupae of a sheep-maggot fly, as well as from those of *Ophyra nigra,* Wied., and *Pollenia stygia,* F. (*Neopollinosa villosa,* R.D.). [*cf. R. A.E.,* B, v, 166].

Foot (K.). **Notes on** *Pediculus vestimenti.*—*Biol. Bull. Marine Biol. Lab., Woods Hole, Mass.,* xxxix, no. 5, November 1920, pp. 261–279.

The peculiar behaviour of lice, *Pediculus humanus* (*vestimenti*), whilst feeding on an individual who was addicted to taking drugs suggested a possible means of controlling these parasites by making the host's blood distasteful or even injurious to them. Observations were made on the reaction of lice to quinine, potassium iodide and sodium salicylate in the blood of the host. Of these quinine caused the most abnormal response, but its toxic effect is not sufficient to eliminate the parasites. Experiments are being continued with a view to finding out the reason of the apparent immunity of some individuals to the attacks of lice, and the effect of other drugs upon the latter.

Hewitt (C. G.). **Insects affecting Live Stock and other Animals.**—*Rept. Domin. Ent. & Consulting Zool., 1917–18, Canada Dept. Agric., Ottawa,* 1920, p. 17. [Received 1st February 1921.]

Investigations have been made in connection with the biology of the chief species of bot-flies [*Gastrophilus*] affecting horses in Western Canada, the results of which have been published elsewhere [*R. A.E.,* B, vii, 55]. These pests and warble flies [*Hypoderma*] in cattle are apparently increasing in abundance in Manitoba. The results of experiments with a small wire insectary used as a trap for Tabanids suggest that such a form of trap might be of great practical value in the vicinity of cattle-yards. Further investigations are being made on the subject.

Hayashi (N.). **Etiology of Tsutsugamushi Disease.**—*Jl. Parasit., Urbana, Ill.,* vii, no. 2, December 1920, pp. 53–68, 3 plates.

This paper deals chiefly with the clinical aspect of the disease and the biology of the causal agent. The organism concerned is a hitherto undescribed species, and is here recorded as *Theileria tsutsugamushi,* sp. n., but the author considers that further study will justify the erection of a new genus for it. The disease is transmitted by a mite, *Trombidium* (*Leptus*) *akamushi,* Brumpt. Bodies similar in appearance and distribution to those found in human cases have been demonstrated in experimentally infected animals.

HERMS (W. B.) & FREEBORN (S. B.). **The Egg-laying Habits of Californian Anophelines.**—*Jl. Parasit., Urbana, Ill.*, vii, no. 2, December 1920, pp. 69-79, 2 figs.

Observations made during May, June and July 1920 on the egg-laying habits of *Anopheles quadrimaculatus occidentalis*, Say, *A. punctipennis*, Say, and *A. pseudopunctipennis*, Theo., are described in detail. The factors governing the time of egg deposition are not known, but light, temperature, humidity and wind probably have an important influence.

The actual process of deposition was observed only in the case of *A. punctipennis*. The incubation period of this species ranges from two to six days, with an average of 3·2 days, that of *A. quadrimaculatus* from two to four days, with an average of 2·5 days. It seems highly probable that temperature exercises a decided effect on incubation, particularly at the extremes, but within a range of 68° to 76° F. little effect was noticed. In connection with desiccation experiments it was found that the eggs of *A. quadrimaculatus* could withstand drying for 72 hours, but those of *A. punctipennis* failed to hatch after drying for 24 hours.

HERMS (W. B.). **Malaria Control.**—*Mthly. Bull. California State Bd. Health, Sacramento*, xvi, no. 5, November 1920, pp. 75–78. [Received 4th February 1921.]

The danger of malaria and resulting economic losses, as well as the possibility of remedial measures, are briefly discussed. The University of California, in co-operation with the State Board of Health, have undertaken investigations into the life-histories and habits of, as well as remedial measures against, the mosquitos occurring within the limits of the State [*R.A.E.*, B, viii, 92–93]. Observations here recorded in connection with the eggs of the Californian Anophelines are noticed in the preceding paper.

PURDY (W. C.). **Should Rice-raising be prohibited near Towns?**—*Mthly. Bull. California State Bd. Health, Sacramento*, xvi, no. 5, November 1920, pp. 78–81. [Received 4th February 1921.]

The advisability of prohibiting the cultivation of rice in the vicinity of towns owing to the risk of malaria is discussed [*cf. R.A.E.*, B, v, 142]. The danger from the presence of this crop depends on the relative abundance of malaria-carrying mosquitos. In justice to all concerned it is suggested that careful investigations into the breeding-places of mosquitos and the prevalence of malaria in the district concerned should precede any curtailment of rice-growing.

HORNBY (H. E.). **The relative Pathogenicity for Cattle of** *Trypanosoma congolense* **and** *T. vivax*.—*Vet. Jl., London*, lxxvii, no. 2, February 1921, pp. 77–78.

As a result of examination of the blood and gland juice of cattle in South Africa, it is concluded, in connection with inoculation experiments, that native cattle may recover spontaneously from *T. vivax* infection, but that no great immunity results therefrom. Infections with *T. congolense* generally prove fatal.

STIRLING (R. F.). **Existence of *Trypanosoma dimorphon* in Central Provinces, India.**—*Vet. Record, London,* N.S. no. 4, 22nd January 1921, p. 71.

Attention is drawn to the isolation of *Trypanosoma dimorphon* from a bullock at Nagpur. In an editorial footnote it is stated that this is apparently the first record of trypansomes of the *dimorphon-congolense* group outside the African continent.

PANISSET (M. L.). **Nouveaux Moyens de Lutte contre la Vermine des Poules.**—*La Vie Agric. et Rur., Paris,* xviii, no. 5, 29th January 1921, p. 75, 1 fig.

The usual methods of dealing with parasites infesting fowls and other domestic birds are described in this article, which contains no new information.

BOTH (G.). **Einfluss der Räude und ihrer Bekämpfung auf den Gesundheitszustand des Pferdes.** [The Influence of Mange and of its Treatment on the Health of the Horse.]—*Deutsche Tierärztl. Wochenschr., Hanover,* xxix, no. 5, 29th January 1921, pp. 55–56.

The literature on mange has been enormously increased owing to the war, and this article describes an effort to co-ordinate it. The work has been divided into two sections. The first deals with the influence of mange on the health of the horse, and the second with the effect of remedial measures.

A twofold effect, mechanical and toxic, is produced by the mites. The toxic action has been carefully studied of late years, and now appears to be the more important of the two. In ordinary cases of mange the toxic action is local, but in advanced cases it affects the entire organism and curative treatment is hopeless. Well fed and well kept horses are less apt to contract mange, and the affection is milder in their case.

As regards the effect of treatment on the health of the horse, it may be said that any remedy active against mites can fulfil its purpose if properly used; no bad effect on the horse's health can result if the composition of the remedy is accurately known and allowance made accordingly. Fumigation with sulphur dioxide is the best method, as it causes the least harm to the animal and permits of systematic treatment on a large scale.

BANG (H.). **Myiasis linearis.**—*Ugeskrift for Laeger, Copenhagen,* 1919, p. 2121.

A case of creeping myiasis on the fingers of man, caused by a larva of *Gastrophilus,* is recorded from Denmark.

ENDERLEIN (G.). **Die Culiciden-Fauna Madagascars.** [The Culicid Fauna of Madagascar.]—*Wiener Ent. Ztg., Vienna,* xxxviii, no. 1–3, 10th November 1920, pp. 47–52. [Received 5th February 1921.]

This list of CULICIDAE collected in Madagascar by Dr. Friederichs includes:—*Culex auritaenia,* sp. n., *C. albigenu,* sp. n., and *C. fatigans* Wied. var. *nigrirostris,* n.

Other Madagascan species are :—ANOPHELINAE : *Anopheles* (*Myzomyia*) *funestus*, Giles, *A.* (*Pyretophorus*) *costalis*, Lw., *A.* (*P.*) *marshalli*, Theo., *A.* (*Myzorhynchus*) *coustani*, Lov., *A.* (*M.*) *barbirostris*, Wulp, *A.* (*M.*) *mauritianus*, Grp., *A.* (*Cellia*) *pharoensis*, Theo., *A.* (*C.*) *squamosus*, Theo., and *A.* (*C.*) *tananarivensis*, Ventr. CULICINAE : *Eretmopodites condei*, Ventr., *Stegomyia fasciata*, F., *S. lamberti*, Ventr., *S. cartroni*, Ventr., *Mansonioides* (*Mansonia*) *uniformis*, Theo., *Culex giganteus*, Ventr., *C. neireti*, Ventr., *C. tigripes*, Grp., *C. insatiabilis*, Big., *C. cartroni*, Ventr., *C. flavus*, Ventr., *C. fatigans*, Wied., *C. laurenti*, Newst., *C. ventrilloni*, Edw., and *Uranotaenia neireti*, Edw.

ECKSTEIN (F.). **Die Stechmückenplage der Wälder.** [The Mosquito Pest in Forests.]—*Naturw. Zeitschr. Forst- u. Landw., Stuttgart*, xviii, no. 11–12, November-December 1920, pp. 285–290. [Received 11th February 1921.]

Mosquitos often prove very troublesome to foresters and forest labourers, and most of the 22 species indigenous to Germany are found in forests. They include *Culex pipiens* and *Theobaldia* (*Culiseta*) *annulata*, and as development in the latter requires only 14 days, a neglected breeding-place may quickly give rise to huge swarms. *T.* (*Culicella*) *morsitans* appears to attack birds only, and it may be the vector of avian malaria. The Anophelines are *Anopheles maculipennis* and *A. bifurcatus*, both being carriers of malaria. The Aëdines are the most common in forests. Owing to their habit of laying eggs close to water in a dry situation the flooding of which leads to hatching, they appear in summer immediately after rain or a rise of the subsoil water.

Ochlerotatus (*Culicada*) *ornatus* and *Anopheles plumbeus* (*nigripes*) are tree-hole breeders, and for this reason they do not become pests.

TÄNZER (E.) & OSTERWALD (H.). *Anopheles* **und Malaria in Halle. Zugleich ein Beitrag zur Morphologie und Biologie der Larve von** *Anopheles maculipennis*, **Meigen.** [Notes on *Anopheles* and Malaria at Halle, being also a Contribution to the Morphology and Biology of the Larva of *A. maculipennis*.]—*Arch. Schiffs- u. Tropenhyg., Leipsic*, xxiii, Beiheft 2, July 1919, 48 pp., 27 figs, 2 plates, 1 map. [Received 14th February 1921.]

The object of this work was to ascertain the distribution of *Anopheles maculipennis* around Halle. An investigation of the biological conditions of the breeding-places was also made.

The Halle region is in the nature of a plateau intersected by wide valleys. There are no large expanses of stagnant water, but natural ponds and pools are not uncommon in the low-lying parts, while artificial ones occur in the higher parts.

The larvae of *A. maculipennis* are very common, but are never found in well shaded water. Very dirty water is avoided, and small collections of water are preferred to large ones. In running water the larvae are found along the banks, especially in the little bays abounding in plants. The lack of vegetation and the agitated state of the surface are probably the chief reason why the larvae are not found in village ponds ; the presence of ducks, etc., does not appear to be a primary factor. The larvae were sometimes found in water far more than one metre deep [*R.A.E.*, B, viii, 223]. The preference for vegetation is very marked, being apparently due principally to the protection it affords against wave motions.

Development from egg to adult requires six to eight weeks. The authors draw a distinction between generations and generation-periods, the difference being that the latter are generations in which individuals of the same age occur at the same time. It should be remembered that the progeny of a given female may be of different ages, owing to successive oviposition. In the Halle region several generations occur in the year, but it is not possible to speak of generation-periods, as larvae occurred at all times. It is probable that the absence of generation-periods obtains in most regions. It has been assumed that the spring and autumn peaks of the malaria curve indicate two definite generation-periods of the mosquito, and that the difference of three or four weeks between the malaria and mosquito curves represents the development of the plasmodia in the mosquito plus the incubation period. If, however, two generation-periods do not occur, this assumption cannot be sustained, and Ziemann's explanation is probable, namely, that the May rise in the malaria curve is due to relapses or new infections in warm dwellings, and that the autumn peak results from a maturing of the oocysts in warmth due to natural conditions and not to artificial heating.

Near Halle, as elsewhere in Germany, malaria was widespread in the past. Its decline is not due to lack of conditions favourable to Anophelines or to circumstances unfavourable to plasmodial development, but to improvements in agriculture and living conditions generally. There is, therefore, little danger of its increase, provided that the unfavourable economic conditions due to the War are ameliorated.

In the authors' experience the value of natural enemies of mosquito larvae and pupae has been overestimated. Nor did they observe any practical effect in connection with water-plants, such as *Utricularia vulgaris* and duck-weed [*Lemna*].

The Bedbug : Its Relation to Public Health, its Habits and Life-history, and Methods of Control.—*Public Health Repts., Washington, D.C.*, xxxv, no. 50, 10th December 1920, pp. 2964–2970. [Received 9th February 1921.]

The information given in this article has already been noticed [*R.A.E.*, B, v, 48].

Young (A. R.). **The Cattle-tick and its Control.**—*New Zealand Jl. Agric., Wellington*, xxi, no. 6, 20th December 1920, pp. 318–323, 3 figs.

Most of the information on *Haemaphysalis bispinosa* contained in this paper has been noticed elsewhere [*R.A.E.*, B, vi, 115 ; viii, 34, 206].

Iverson (J. P.). **Annual Report of the Division of Animal Industry, 1919-20.**—*Mthly. Bull. Cal. Dept. Agric., Sacramento*, ix, no. 10–11, October-November 1920, pp. 503–520, 8 figs. [Received 10th February 1921.]

Measures for the extermination of the Texas fever tick, *Boophilus* (*Margaropus*) *annulatus*, are enforced by law in California. Dipping in an arsenical solution two or three times at intervals of 21 days is the method practised, the solution consisting of 24 lb. sodium carbonate, 8 lb. arsenic trioxide, 1 U.S. gal. pine tar, and water up to 500 gals.

CARNEGIE DICKSON (W. E.). **Mites as internal Parasites of Man.**—*Jl. Trop. Med. & Hyg., London,* xxiv, no. 3, 1st February 1921, pp. 25–27, 1 fig.

Two cases of infection of the urinary tract in man by mites are the subject of this note. In one the mites concerned were identified as *Tyroglyphus* (*Aleurobius*) *farinae,* DeG., and in the other, as *Tarsonemus* sp.

LOUGHNAN (W. F. M.). **Seven-day Fever in Aden.**—*Jl. R.A.M.C., London,* xxxvi, no. 2, February 1921, pp. 137-141.

On the Aden littoral seven-day fever appears to be a very definite and distinct disease. In British Arabia it is endemic, and attacks Europeans and Orientals with equal severity.

There may be some relationship between the disease and the climatic temperature and atmospheric humidity; possibly the connection is an entomological one. The fever appears about the end of April and is present until the end of September. There are no Anophelines within 10 miles. *Culex fatigans* and *Stegomyia* are present throughout the year, chiefly breeding in shallow brackish wells, and in increased numbers from the end of May to the end of September, when the fever is most prevalent.

Pest Remedies and Stock Dips.—*Jl. Dept. Agric. Union S. Africa, Pretoria,* ii, no. 1, January 1921, pp. 56–58.

Under Act No. 21 of 1917 a number of regulations have been framed in connection with the sale of stock dips, and it is proposed that they shall come into force from 1st April 1921. They deal with the registration of stock dips, the information to be placed on the labels of receptacles of such preparations, and the sale of such preparations.

Any person dealing in a stock dip not registered under his own name or brand must, when required to do so by a competent authority, produce a statement of its composition guaranteed under these regulations or other satisfactory proof of registration.

PRINGAULT (E.). **Présence de Spirochètes chez** *Phlebotomus perniciosus,* **Newstead.**—*C. R. Soc. Biol., Paris,* lxxxiv, no. 4, 29th January 1921, pp. 209–210.

A spirochaete has been found in *Phlebotomus perniciosus,* Newst., in the Marseilles region, and the name of *Spirochaeta phlebotomi* is suggested for it, as it appears to be a distinct species.

VAN SACEGHEM (R.). **La Trypanosomiase du Ruanda.**—*C. R. Soc. Biol., Paris,* lxxxiv, no. 5, 5th February 1921, pp. 283–286.

Evidence is adduced that appears to the author clearly to establish the fact that pathogenic trypanosomes may be transmitted in nature by flies other than *Glossina.*

Cattle in Ruanda are suffering from a severe epizootic of trypanosomiasis. The whole district is above an altitude of 4,600 ft., and *Glossina* is non-existent there. The disease appears to have been quite unknown a few years ago, and seems to have been introduced by infected mules during the war. The Ruanda trypanosome is pathogenic to cattle, sheep, guinea-pigs, and probably equines as well. It is polymorphous, has no free flagellum, and resembles *Trypanosoma congolense* and *T. pecorum*. *Stomoxys* is common at certain seasons, and is believed to be the vector. Examples that had recently fed on infected animals contained living trypanosomes in the gut, but the parasites had disappeared on the following day. The saliva of the fly is not injurious to the parasites. The latter were not seen on the proboscis of the fly.

WOLLMAN (E.). **Le Rôle des Mouches dans le Transport de Germes pathogènes étudié par la Technique des Elevages aseptiques.**—*C. R. hebdom. Acad. Sci., Paris*, clxxii, no. 5, 31st January 1921, pp. 298–301.

Experiments with *Calliphora vomitoria*, *Lucilia caesar* and house-flies [*Musca domestica*] show that they may be infected with typhoid, dysenteric or tubercle bacilli in the larval stage, in which case they remain infective during the pupal stage. The pathogenic organism is not, however, passed on to the adult, but these may become infected by organisms adhering to the outside of the pupa.

House-flies infected in the adult stage remain infective only for a few days, if removed from the source of infection. The loss of infectivity is probably mechanical.

FERREL (J. A.). **Resultados de los recientes Esfuerzos para el Control del Desarrollo de la Malaria.** [The Results of recent Work in controlling the Development of Malaria.]—*Anales Dept. Nac. Higiene, Buenos Aires*, xxvi, no. 4, July-August 1920, pp. 253–262. [Received 18th February 1921.]

This article briefly describes the results of anti-malaria work in the United States since 1913.

HOWARD (L. O.). U.S. Bur. Ent. **The House-fly—Carrier of Disease.**—*Ohio State Dept. Health, Columbus*, May 1920, 16 pp., 11 figs. [Received 18th February 1921.]

This pamphlet is one of a series on public health prepared by the American Medical Association. It contains a brief description of *Musca domestica* and of its life-history, and deals with preventive and remedial measures.

GORGAS (W. C.), CARTER (H. R.) & LYSTER (T. C.). **Yellow Fever: Its Distribution and Control in 1920.**—*Southern Med. Jl., Birmingham, Ala.*, xiii, no. 12, December 1920, pp. 873–880.

Yellow-fever areas have been enormously reduced in size and, with the exception of the Yucatan Peninsula, those now existing are well under control. The isolation of infected areas and anti-*Stegomyia* work around them has reduced the areas of epidemics. The aetiology, pathology and treatment of the disease are rapidly being put into conclusive form. With the exception of Mexico, Latin-American countries now co-operate in the work. Campaigns against *Stegomyia* alone are believed to be sufficient for the elimination of the disease.

Bonne-Wepster (J.) & Bonne (C.). **Notes on South American Mosquitoes in the British Museum (Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus, Washington, D.C.*, ix, no. 1–3, January–March 1921, pp. 1–26.

Dyarina tripartita, gen. et sp. n., is proposed to replace Dyar's genus *Phoniomyia* (not *Phoniomyia* as used by Theobald), and *D. lassalli*, sp. n., is suggested for the mosquito from Trinidad recorded as *Phoniomyia trinidadensis*, Theo., by Dyar and Knab. Keys are given to the species of *Sabethinus, Dodecamyia, Dyarina* and *Goeldia*.

Dyar (H. G.). **Comment on the preceding Paper (Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus, Washington, D.C.*, ix, no. 1–3, January–March 1921, pp. 26–31.

A number of comments are made on the questions of synonymy raised in the foregoing paper.

Dyar (H. G.). **The Male of** *Psorophora coffini*, **Dyar and Knab (Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus, Washington, D.C.*, ix, no. 1–3, January–March 1921, p. 31.

Psorophora coffini, D. & K., the male of which is here described, had hitherto only been known from the Bahamas, but has now been bred from larvae in St. Thomas, Virgin Islands.

Dyar (H. G.). **The Swarming of** *Culex quinquefasciatus*, **Say (Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus, Washington, D.C.*, ix, no. 1–3, January–March 1921, p. 32.

Attention is drawn to the swarming of males of *Culex fatigans* (*quinquefasciatus*) round human beings at dusk in Texas.

Dyar (H. G.). **Ring-legged** *Culex* **in Texas (Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus, Washington, D.C.*, ix, no. 1–3, January–March 1921, pp. 32–34.

The species dealt with are *Culex tarsalis* Coq., *C. coronator*, D. & K., and *C. thriambus*, sp. n., larvae of which were found in a dirty pool beside a river.

Dyar (H. G.). **Three new Mosquitoes from Costa Rica (Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus, Washington, D.C.*, ix, no. 1–3, January–March 1921, pp. 34–36.

The new species described are *Culex* (*Choeroporpa*) *alfaroi*, *C.* (*C.*) *holoneus*, and *Aëdes* (*Culiselsa*) *perichares*. *Culiselsa*, as used by the author, replaces *Taeniorhynchus* to avoid confusion caused by the use of this name in the sense of *Mansonia* as employed by Theobald, Edwards and others.

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Dyar (H. G.). **Notes on the North American Species of** *Chocroporpa* **(Diptera, Culicidae).** *Insecutor Inscitiae Menstruus, Washington, D.C.*, ix, no. 1-3, January-March 1921, pp. 37-39.

The synonymy of various species is discussed, and *Culex* (*Choeroporpa*) *degustator*, sp. n., is described.

Dyar (H. G.) & Ludlow (C. S.). **Two new American Mosquitoes (Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus, Washington, D.C.*, ix, no. 1-3, January-March 1921, pp. 46-50.

The new species described are *Culex* (*Melanoconion*) *homoeopas*, from New Orleans, possibly imported from Nicaragua, and *C.* (*Chocroporpa*) *dysmathes* from the Panama Canal Zone. A key is given to the described species of *Melanoconion*, based on the characters of the male hypopygium.

Hacker (H. P.). **Federated Malay States Malaria Bureau Reports.**—ii, November 1920, *London*, 1921, 47 pp., 1 fig., 2 plans. [Received 17th February 1921.]

This report continues the publication of data collected by the F.M.S. Malaria Bureau [*R. A. E.*, B, viii, 84], and contains a record of the observations made during the three preceding years. Attention is called to a number of recent changes in nomenclature [*R. A. E.*, B, viii, 49], *Anopheles rossi* var. *indefinitus*, Ludl., becoming *A. vagus*, Dön., the variety recorded as *A. rossi*, Giles, in vol. i, becoming *A. subpictus*, Grassi, var. *malayensis*, nov.; and *A. hunteri*, Strickl., becoming *A. separatus*, Leic.

The first report deals with the distribution of Anophelines in the Brickfields Road area of Kuala Lumpur. It was desired to find out whether the eradication of the swamps was advisable, and also to trace the source of a number of malaria cases from this area.

A method for grouping the species found as representative of faunistic areas has been introduced and will be applied to further results as a method for elucidating problems of distribution. It is based on the numerical frequency with which the various species are found together in nature, and thereby shows which species are most commonly found in the same breeding-place in association with any given species. The number of times a species is found alone, added to the number of times it is found in association in the same breeding-place with each of the other species, gives the total number of "association units" available for that species. It is necessary for the purpose of comparison to express the component parts of this number as percentages, and it is permissible to do so if the total number of association units, on which this series of percentages is based, is also shown. A convenient term for the percentage association of one species with each of the other species is "association value." This method does not depend on personal descriptions of individual breeding-places, but is built up quite mechanically from the records of the species found in a given number of breeding-places.

The most widely distributed species in the area were the large-pool breeders, *A. barbirostris* and *A. hyrcanus*; the recognised malaria-carriers, *A. fuliginosus* and *A. aconitus*, although not numerous at

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the time of examination, have been shown to be closely associated with these species by a preference for similar breeding-places. It is possible, therefore, that under other conditions the carriers may become much more numerous.

The small-pool breeders, *A. vagus* and *A. kochi*, were not so widely distributed, but supplied proportionately more specimens. The recognised carrier, *A. maculatus*, has been shown to occur in the same kind of places as these species, and in more continuous wet weather would probably be more numerous, owing to the increase in seepage water and small pools in the districts characterised by the small-pool breeders. The dry weather at the time of the examination was unfavourable to *A. maculatus*, as many of the springs would be dry, and those containing water would be flushed out by intermittent heavy rain.

An adequate cause of the malaria cases admitted to hospital has been found, therefore, and a reclamation of the swamps is justified as a measure for malaria prevention, apart from other considerations.

In the first of two notes appended to the above report, details are given regarding the association method referred to, series of figures being given in the case of each species. The grouping agrees closely with what is generally known about the breeding-places. Group I, depending on a common preference for small open pools or open hilly country, includes *A. kochi*, *A. vagus*, *A. maculatus*, *A. karwari*, and *A. ludlowi*. The last-named may separate itself from this group as the chief member of a salt-water fauna when further data have been collected. Group II, depending on a preference for large swampy pools or low-lying country, includes *A. barbirostris*, *A. hyrcanus*, *A. aconitus*, *A. fuliginosus*, *A. subpictus* var. *malayensis*, *A. separatus*, *A. tessellatus*, and *A. umbrosus*, and probably *A. aurirostris*. The last three may separate themselves into a jungle-swamp fauna leaving the rest of the group as an open swamp fauna. Group III, depending on a preference for jungle, probably hilly jungle, includes *A. aitkeni*, *A. leucosphyrus*, *A. albotaeniatus* var. *montanus*, and *A. novumbrosus*. Group IV (species with highly specialised breeding-places) is represented by *A. asiaticus*.

The second note deals with artificial receptacles of water as breeding-places of Anophelines. The following conclusions are reached :—Larvae are found occasionally in such receptacles and more commonly so when the external conditions are unfavourable for their breeding. Age and disuse render such receptacles more suitable for breeding. The care of domestic collections of water and the clearing up of disused tins and bottles are justified.

The second report deals with an outbreak of malaria on the banks of the Perak River in January 1918. The Anophelines found were :—*A. ludlowi*, *A. vagus*, *A. kochi*, *A. tessellatus*, *A. aurirostris*, *A. leucosphyrus*, *A. hyrcanus* and larvae resembling those of *A. umbrosus*. As regards the pathogenicity of the various species, while no Anopheline is free from suspicion, the important carriers are *A. umbrosus* and *A. ludlowi*, especially the latter. From the data discussed it is concluded that *A. ludlowi* was the main cause of the outbreak, that it was enabled to travel up-river by the increase of the salinity of the water during the dry weather, and that the onset of the rains made the water unsuitable for it to breed in and thereby stopped the outbreak.

The suggestions for the reduction of malaria in this area include methods against the infection of mosquitos, and the reduction of

Anopheline breeding. The latter may be divided into methods directed mainly against *A. ludlowi* and against *A. umbrosus.*

Notes were made on the relation of Anopheline breeding to mangroves in view of unpublished observations of Strickland's on this subject. It appears that it is not the question of mangrove by itself that governs the presence of Anophelines, but the question of the salinity of the water. The observations hitherto made indicate that the belt of mangrove and the belt of Anopheline distribution cut each other in the estuary of the river, and this point possibly depends on the salinity of the water above and below it. Further work is needed, and should be controlled by the examination of the salinity of the water from each breeding-place.

MILLER (D.). **Report on the Mosquito Investigation carried out in the North Auckland Peninsula of New Zealand during the Summer of 1918-19. Part I.**—*N.Z. Dept. Health, Wellington,* Pubn. no. 3, 1920, 38 pp., 33 figs., 7 maps.

The object of this mosquito survey of the North Auckland Peninsula was to ascertain whether *Stegomyia fasciata* (*Aëdes calopus*) or any malaria-carrying Anophelines existed there, or whether conditions favourable to them are present.

Prior to this investigation, the only mosquitos recorded from New Zealand were:—*Culicelsa albirostris,* Macq., *Culex pervigilans,* Berg, *Taeniorhynchus acer,* Theo., *T. iracundus,* Wlk., and *Uranotaenia argyropus,* Wlk. The first three are also known from Australia. Additional species were found, including *Ochlerotatus notoscriptus* and one which will form a new genus and probably subfamily. These will be dealt with in a second part of this report.

The innumerable sluggish, weed-filled streams and swamps constitute the permanent sources of mosquito infestation in the peninsula, but the progress of agriculture is converting many of them into temporary breeding-places. In places where there are no apparent collections of water, the leaf-bases of epiphytic plants and the stems of dead tree-ferns are a source of mosquito propagation, as they retain sufficient water to form excellent breeding-places. The innumerable holes left by gum-diggers in kauri-gum lands and the stretches of country formed of outcropping volcanic rocks are temporary areas of infestation. Though lakes and lagoons are common, no mosquitos breed in them, owing to natural enemies such as *Notonecta* sp. (water-boatman), dragon-fly larvae, etc. However, along the margins of extensive sheets of water where depressions filled with soakage occur, mosquito larvae abound. Catch-basins, gully-traps, tanks, water-troughs, old tins and bottles, roof-gutters, etc., are most important sources of artificial infestation invariably found in towns and cities.

The species most common in the peninsula are *Culex pervigilans* and *Ochlerotatus notoscriptus,* the former being more generally distributed than the latter, which was restricted almost entirely to Auckland City. Both were frequently observed breeding in the same receptacle, the former being nocturnal and inflicting painful wounds, and the latter diurnal and not very troublesome.

From this investigation it may be stated that *S. fasciata* does not occur in the North Auckland Peninsula. There was some indication that a certain unknown Anopheline occurred at Kaitaia. There is also a vague possibility of the occurrence of a malaria-carrying mosquito, owing to symptoms resembling those of malaria being noticed in some individuals who had never been out of New Zealand.

All the above findings point to the desirability of dealing with mosquito-breeding grounds, at least in the more populated areas.

Carter (H. F.), Ingram (A.) & Macfie (J. W. S.). **Observations on the Ceratopogonine Midges of the Gold Coast, with Descriptions of New Species. Part 3.**—*Ann. Trop. Med. & Parasit., Liverpool,* xiv, no. 3, 8th February 1921, pp. 309–331, 13 figs.

In this continuation of a paper previously noticed [*R.A.E.*, B, ix, 25] several new species are described; these are *Prionognathus marmoratus,* gen. et sp. n., *P. maculipennis, P. pseudomaculipennis, P. maculithorax, Atrichopogon xanthoaspidium* and *Stilobezzia spirogyrae.* The last-named is apparently the first species of this genus to be described from Tropical Africa. The larvae were found associated with an alga, *Spirogyra* sp.

Bezzi (M.). ***Musca inferior,* Stein, Type of a New Genus of Philaematomyne Flies (Diptera).**—*Ann. Trop. Med. & Parasit., Liverpool,* xiv, no. 3, 8th February 1921, pp. 333–340.

The new genus, *Ptilolepis,* is erected with *Musca inferior,* Stein, as the type. The work of various authors on the synonymy of this species is reviewed and the characters of the new genus are described.

Breinl (A.). **Preliminary Note on the Development of the Larvae of *Dirofilaria immitis* in Dog Fleas, *Ctenocephalus felis* and *canis.***—*Ann. Trop. Med. & Parasit., Liverpool,* xiv, no. 3, 8th February 1921, pp. 389–392.

The fact that *Dirofilaria immitis* does not require a definite genus of mosquito for the successful completion of its life-history led to further investigations to ascertain whether this parasite could not complete its life-cycle in other ectoparasites, such as fleas. As a result of observations here described the fleas, *Ctenocephalus felis* and *C. canis,* were found to be effective intermediary hosts. In one case a mature larva had penetrated the unbroken skin of a puppy.

Garcia Banus (M.). **Noguchi's Yellow Fever Research.**—*Internat. Jl. Public Health, Geneva,* ii, no. 1, January–February 1921, pp. 50–60.

A resumé is given of Noguchi's investigation on the causal agent of yellow fever.

Among the reasons for regarding *Leptospira icteroides* as being the organism concerned are its occurrence in and cultivation from yellow fever cases; inoculation of cultures of this organism reproduces the disease in guinea-pigs, and the organism can be isolated from them; its properties and characteristics agree with those of the yellow fever virus; it is carried by *Stegomyia* [*fasciata*], and when thus carried it reproduces the disease.

The only proof of identity that is unsatisfied by Noguchi's work is the reproduction of the disease in man by means of pure cultures of the organism.

The Progress and Diffusion of Plague, Cholera and Yellow Fever throughout the World, 1914-1917.—*Ministry of Health, London, Repts. on Public Health & Med. Subjects*, no. 3, 1920, 276 pp. Price 7*s*. 6*d*.

The title of this publication indicates its contents.

LEAK (W. N.). **On the Improvement of Oiling Fluids for Anti-mosquito Work.**—*Jl. Trop. Med. & Hyg., London*, xxiv, no. 4, 15th February 1921, pp. 37-40.

Paraffin, universally used for oiling as an anti-mosquito measure, is not an ideal film producer, and many attempts have been made to improve on the ordinary film, though no definite modifications are at present largely in use. The admixture of linseed oil appears to have been tried with some success by British troops in Persia, the chief gain being increased permanence. Cotton-seed oil would give an even more permanent film, but the addition of such oils tends to diminish the spreading power.

When in Palestine, the author found that the addition of cresol caused paraffin to spread remarkably well on water. An investigation of the substances composing cresol showed castor-oil to be the active factor. No other oil has nearly so marked an effect. If one drop of paraffin will make a film five inches in diameter, on the same surface a similar-sized drop with 1 per cent. castor-oil added will make a film two feet in diameter, the spreading power being increased about twenty-five times. Paraffin in bulk, when poured on to water, will spread up to a certain point, and then the edges get broken. The castor-oil mixture film retains its continuity very much longer, and its edges appear to retain their power of spreading actively as long as there is space to be covered. On an exceptionally clean surface of water two ounces of paraffin spread over an area of about five yards in diameter. A similar quantity of 1 per cent. mixture in a quarter of an hour had formed an unbroken film 30 yards in diameter, and was still actively spreading.

Castor-oil is ordinarily said to be insoluble in mineral oils, but in a warm climate a mixture up to 2 per cent. can be made that will not separate appreciably in a week, while in a cool climate only about 0.5 per cent. will remain suspended for any length of time. Very small additions make a decided difference in the behaviour of the film, as little as one-tenth per cent. producing a very much more active film in every way.

Perhaps the greatest advantage which such an active film might be expected to show is in the presence of reeds, and this was found to be the case by a practical test.

The mixture film is not only active, but also extremely tenacious. If the film is broken by a stone being thrown in, the rapidity with which the break is filled up is remarkable. With a 1 per cent. film moderate breezes will not cause the breaks often seen at the top of each wave with an ordinary film. The practical value of this tenacity in oiling difficult places is very great. The eventual thickness of a film is, of course, determined by the actual amount of oil allowed per unit of area, provided the oil will spread evenly.

The value of this mixture lies in greater economy, greater adaptability, and greater certainty of action. The last quality is marked in the presence of dust on the water, in the presence of soap or soapy material in the water, and in the presence of oil or grease already on the water. These are the three chief causes that prevent films of oil from spreading, and they should always be considered when estimating the required addition of castor-oil if oiling is to be done economically and effectively.

PARROT (A.). **A propos de l'identification des Phlébotomes de France.** —*Bull. Soc. Path. Exot., Paris*, xiv, no. 1, 12th January 1921, pp. 21–22.

The female *Phlebotomus* taken by Mansion at Bron-Village (Rhône) [*R. A. E.*, B, ix, 37] is considered to be *Phlebotomus perniciosus*, Newst. The scanty information regarding the specific characters of the females of this genus is chiefly due to the lack of precision hitherto prevailing in the matter of specific descriptions. The difficulties attending determination compel the use of methods not quite usual in systematic work. França and the author have endeavoured to lay down the general rules to be followed [*R. A. E.*, B, ix, 21], and the almost certain determination of the above-mentioned specimen proves that existing lacunae are being filled.

FRANÇA (C.). **Sur la Détermination spécifique d'une Femelle de Phlébotome.**—*Bull. Soc. Path. Exot., Paris*, xiv, no. 1, 12th January 1921, pp. 23–24.

The characters found in *Phlebotomus perniciosus*, Newst., and those of the female specimen recorded in the preceding paper are given in order to show their agreement.

The females of European species may be divided according to wing and colour characters, and a key to them based on these is given.

MARTIAL (R.) & SENEVET (G.). **Présence à Fez d'*Ornithodorus talaje* (Guérin-Méneville, 1849).—Action pathogène sur l'Homme.** —*Bull. Soc. Path. Exot., Paris*, xiv, no. 1, 12th January 1921, pp. 24–26.

Some ticks found at Fez are believed to be *Ornithodorus talaje*; they are distinct from *O. maroccanus*, already recorded from Morocco [*R. A. E.*, B, vii, 86]. The discovery was made as a result of bites suffered in a native dwelling.

DEL PONTE (E.). **Contribución al Estudio del Gen. *Triatoma*, Lap. Primera Parte. Anatomía externa.** [A Contribution to the Study of the Genus *Triatoma*. First Part. The External Anatomy.]—*Rev. Inst. Bact., Buenos Aires*, ii, no. 5, May 1920, pp. 729–744, 23 plates. [Received 22nd February 1921.]

The subject-matter of this paper is indicated by its title.

ZIEMANN (H.). **Einfluss der Tropenmedizin auf die medizinische Wissenschaft.** [The Influence of Tropical Medicine on Medical Science.]—*Arch. Schiffs- u. Trop.- Hyg., Leipsic*, xxv, no. 1, February 1921, pp. 14–31.

This paper is divided into a number of sections, one of which deals with the increasing importance of Arthropods in the transmission of disease and the part played by Tropical Medicine in this connection.

A brief review of the numerous insects concerned is given. Another section deals with the increased knowledge, due to Tropical Medicine, of the biology and morphology of insect vectors.

Ewing (H. E.). U.S. Bur. Ent. **The Genus *Trombicula*, Berlese, in America and the Orient.**—*Ann. Ent. Soc. Amer., Columbus, Ohio*, xiii, no. 4, December 1920, pp. 381–390, 3 figs.

A key to the genus is given, and *Trombicula splendens*, Ew., and *T. coarctata*, Berl., are described and compared. Although there is a strong superficial resemblance between these two mites, close examination proves them to be distinct. *T. minor*, Berl., is considered to be the nymph of *T. mediocris*, Berl., by Miyajima, the former name having priority; but more data concerning the life-history of *T. minor* are needed before the question can be settled with certainty.

T. cinnabaris, sp. n., is described from Virginia and Maryland. The adults of this species feed chiefly on small Arthropods.

Debaisieux (P.). ***Coelomycidium simuli*, nov. gen., nov. spec., et Remarques sur l'*Amoebidium* des Larves de *Simulium*.**—*La Cellule, Lierre & Louvain*, xxx, no. 2, 1920, pp. 249–276, 2 plates.

The various stages and the systematic position of *Coelomycidium simuli*, gen. et sp. n., a parasite of Simuliids, probably of *Simulium* (*Melusina*) *maculatum*, Meig., are described.

Ramakrishna Ayyar (T. V.). **Note on a Musciphagous Wasp (*Bembex lunata*).**—*Rept. Proc. 3rd Ent. Meeting, Pusa, February 1919, Calcutta*, iii, 1920, pp. 909–910, 1 plate.

Bembex lunata is recorded from India as predaceous on various blood-sucking flies, such as *Stomoxys*, *Lyperosia* and *Philaematomyia*.

Fletcher (T. B.). **Report of the Imperial Pathological Entomologist.**—*Sci. Repts. Agric. Research Inst., Pusa, 1919–20, Calcutta*, 1920, pp. 95–108. [Received 18th February 1921.]

Owing to the death of Mr. Howlett, this report has been written by the Imperial Entomologist from the notes available.

A study was made from November 1919 to February 1920 of parasites of Tabanids; these were obtained from egg-masses of *Tabanus sanguineus*, *T. albimedius*, *T. bicallosus*, *T. crassus*, *T. virgo*, and *Chrysops stimulans*. When egg-masses were being collected in November 1919, no trace was found of *T. hilaris*, *T. nemocallosus*, or *T. brunnipennis*, which are commonly found during the rains at Pusa. The dates of emergence of the parasites from the various Tabanids are recorded.

Among the parasites collected from birds' nests were two species of blood-sucking midges of the genus *Culicoides*, found in large numbers in crows' nests.

A Lygaeid known as the squirrel bug has been shown to suck the blood of man, rabbit and goat under laboratory conditions, and was generally found in squirrels' nests. No bug of this family has hitherto been recorded to suck blood, though many of them are known to harbour flagellates, either *Herpetomonas* or *Crithidia*. A species of *Stomoxys*, apparently *S. oblongata*, was found to breed inside the nest materials of a mynah and of a kite. *Phlebotomus argentipes* was observed to emerge from nest materials in the laboratory, and though no larvae were found, several empty pupal cases were discovered. These midges were also observed in large numbers in the cages of ostriches and other birds in the Victoria Garden at Bombay. *Cimex hemiptera* (*rotundatus*) in all stages, and pupae of *Hippobosca maculata*, were also found in a mynah's nest, and a Muscid was found breeding in the nest of another bird.

Experiments on the effect of soluble and insoluble salts and poisons on mosquito larvae and pupae seem to confirm the conclusion that soluble substances operate chiefly cutaneously and insoluble ones orally. A series of experiments were carried out on the deterrent effects of many chemicals on *Dacus* (*Choetodacus*) *zonatus* with a view to finding out the chemotactic reactions of fruit-flies and of mosquitos. The numbers of flies that came to the various repellents were as follows :—Cinnamic aldehyde, 0 ; turpentine, 38 ; camphor, 17 ; naphthaline, 22 ; kerosene, 12 ; benzine, 27 ; acetic acid, 19 ; carbolic acid, 0 ; oxalic acid, 12 ; hydrochloric acid, 11 ; sulphuric acid, 3 ; mercuric chloride, 0 ; soap, 13 ; formalin, 29 ; amyl acetate, 78 ; methyl eugenol, 33.

In attempting to discover the rôle of blood in ovulation in mosquitos, eggs were obtained by feeding with peptone and milk, without any meal of blood, from *Stegomyia albopicta* (*scutellaris*) and, in one instance, from *S. vittata* (*sugens*). Eggs were obtained in two out of four experiments with shed goat's blood. Mosquitos enclosed with tender plants died within four days without ovipositing. Saccharine and glycerine in various strengths were offered to mosquitos, but they refused to feed on these substances.

Experiments with bed-bugs [*Cimex lectularius*] at varying temperatures showed that a two-minutes exposure to a temperature of 126°F. is sufficient to kill them.

Tests with various repellent preparations against *Armigeres obturbans* were made, and the results are shown in a list giving the average efficacy of each. It seems hardly possible to produce a preparation that will remain fully effective for three hours. A list is given of substances that remain effective for over nine minutes. Tests of the repellent properties of about 40 substances at distances of three to four inches were made. These led to the conclusion that the factors concerned with distance repulsion and contact repulsion are probably not identical. Neither method of repulsion is apparently proportional to the poisonous effect on the mosquito of the vapour of the substance used. Mosquitos probably cannot be kept at a distance from the body by any practically applicable chemical repellent for any length of time. A list of the chemicals tried is given in the order of their merit, creosote, naphthaline and wood oil standing first.

MACKINNON (E.). **The Relation of Insects to the Dissemination of Diseases.**—*Science & Industry, Melbourne*, ii, no. 11, November 1920, pp. 652–658. [Received 2nd March 1921.]

The relation of certain insects to the dissemination of diseases has now become an accepted fact. The various ways in which micro-organisms may be transmitted by insects, whether actively carried, mechanically carried, or by means of indirect association, are briefly described with examples.

TORRANCE (F.). **Effect of Dipping on the Production of Milch Cows.**—*Agric. Gaz., Canada, Ottawa*, viii, no. 1, January–February 1921, p. 25.

Experiments show that cows may be dipped in the official lime and sulphur solution at a temperature of from 110°F. to 118°F. without affecting the secretion of milk to any appreciable extent.

DUBLET (—). **L'Extrait de Chenilles de la Mite de la Ruche d'Abeilles pour la Guérison de la Tuberculose expérimentale.**—*C. R. Soc. Biol., Paris*, lxxxiv, no. 8, 26th February 1921, pp. 381–382.

In view of the resistance exhibited by the caterpillars of the wax moth [*Galleria mellonella*] to the tubercle bacillus [*R.A.E.*, B, viii, 86], experiments have been made with a view to ascertaining the curative property of an extract made from the bodies of these larvae. Guinea-pigs inoculated with this vaccine, and subsequently with tubercle bacilli, did not contract the disease, and the possibility of treating tuberculosis by this means is admitted. The method employed should directly affect the pathogenic agent by preventing the acquisition of the acid-resistant character or by destroying it should it have already formed, rather than by attempting to neutralise the toxin secreted by Koch's bacillus.

LEGER (M.). **Microfilaire sanguine du Boeuf à la Guyane Française.**—*C.R. Soc. Biol., Paris*, lxxxiv, no. 8, 26th February 1921, pp. 419–420.

A filarial embryo has been isolated from the blood of a cow infected with *Trypanosoma guyanense* in French Guiana. It has been provisionally named *Microfilaria guyanensis*. Microfilariae are less frequently met with in the blood of bovines than of equines.

SERGENT (Et. & Ed.). **Avantages de la Quininisation preventive démontrés et précisés expérimentalement (Paludisme des Oiseaux).**—*Ann. Inst. Pasteur, Paris*, xxxv, no. 2, February 1921, pp. 125–141, 5 figs.

The experiments described were made on canaries infected with *Plasmodium relictum*. The birds received subcutaneous injections of quinine daily for three weeks from the day of inoculation and then every second day. The birds thus treated did not show parasites in the peripheral blood, or if infected, the infection remained latent from the onset. As soon as the treatment was stopped the immunity ceased.

As applied to man, those treated by preventive quininisation are only subject to latent infection, and are therefore less dangerous as reservoirs than others presenting intense infection of the blood.

BLANC (G.) & CAMINOPETROS (J.). **Enquête sur le Bouton d'Orient en Crète. Réflexions qu'elle suggère sur l'Étiologie et le Mode de Dispersion de cette Maladie.** [Enquiry into Oriental Sore in Crete. Reflections suggested on the Etiology and Mode of Dispersion of the Disease.]—*Ann. Inst. Pasteur, Paris*, xxxv, no. 2, February 1921, pp. 151–166, 2 figs.

Oriental sore is chiefly disseminated in Crete by direct contact. The biting flies occurring in the districts under observation are

Phlebotomus papatasii, Scop., *P. sergenti*, Parr., *Stegomyia fasciata*, F., and *Anopheles maculipennis*, Meig., but they are not thought to be incriminated in the transmission of the disease. Owing to the absence or extreme rarity of camels and geckos in the island, man is considered to be the only carrier of the virus. These observations confirm the negative results of previous experiments with geckos as the reservoir of the virus [*R.A.E.*, B, viii, 181]. Experiments made with flies show that five hours after contamination they are unable to transmit the disease mechanically.

WESENBERG-LUND (C.). **Contributions to the Biology of the Danish Culicidae.**—*Mem. Acad. R. Sci. & Lettres, Copenhagen,* Sec. Sci., 8th ser., vii, no. 1, 1921, 210 pp., 21 pls., 19 figs.

In this work are published the results of a number of years' observations on Danish mosquitos by the author and his assistant, Mr. Kryger, the observations having been made in field and laboratory, mainly during the years 1917–1920. The paper includes not only a large amount of hitherto unpublished matter, but also a summary and discussion of the previous work of the author and of other writers on European mosquitos.

An introductory chapter deals very fully with the morphology of the Culicine larvae, especially as regards the mouth-parts and the respiratory system. The relationship between structure and feeding-habits (whether mainly at the water-surface or at the bottom) is discussed, the conclusion being drawn that the mode of feeding is connected with two distinct types of structure of the mouth-parts. Modes of wintering, order of hatching in the spring, and blood-sucking habits are also discussed.

The main portion of the work is devoted to a complete account of the structure, biology and distribution of the known Danish Culicine mosquitos, the larvae of each species (where known) being illustrated. In the descriptions of the larvae, in addition to characters that have been in common use, stress is laid for diagnostic purposes on the mouth-parts, the hair-formula of the front margin of the thorax, and the number of hairs in the tufts composing the anal brush.

The nomenclature has been revised to accord with the British Museum practice, specimens of all the more obscure species having been sent to Mr. F. W. Edwards for determination. The following species are dealt with:—*Aëdes cinereus*, Mg., *Ochlerotatus caspius*, Pall., *O. curriei*, Coq., *O. maculatus*, Mg. (*cantans*, Mg.), *O. annulipes*, Mg., *O. vexans*, Mg., *O. excrucians*, Wlk., *O. lutescens*, F., *O. detritus*, Hal., *O. communis*, De G., *O. punctor*, Kirby, *O. nigripes*, Zett., *O. prodotes*, Dyar, *O. rusticus*, Rossi, *O. diantaeus*, H. D. & K., *O. sticticus*, Mg., var. *concinnus*, Steph., *O.* (*Finlaya*) *geniculatus*, Ol., *Taeniorhynchus richiardii*, Fic., *Theobaldia annulata*, Schr., *T.* (*Culicella*) *morsitans*, Theo., *Culex pipiens*, L., *C. ciliaris*, L., *C. nigritulus*, Theo. (*nec* Zett.).

Of these, *O. vexans*, *O. punctor* and *O. sticticus* are very rare in Denmark, and the larvae have not been found there. *O. nigripes* is described from Greenland only; the author's previous record of this species from Denmark proves to apply to a late autumn generation of *O. communis*, which differs from the ordinary spring form in its somewhat larger size. *C. ciliaris* is distinguished from *C. pipiens* only because of a peculiarity of habit of the adults. *C. nigritulus* is described from larvae only, the adults having been lost. *O. excrucians*, *O. lutescens* (*fletcheri*), *O. prodotes* and *O. diantaeus* were known chiefly as American, but have recently been recorded in Europe under other names by Martini, the synonymy being given in an appendix, in which a variety *subochrea* of *Theobaldia annulata* is mentioned, and the new name *salinellus*, Edw., is given to the species recorded as *Aëdes terriei*, Theo., by Martini. *O. caspius*, Pall., is recorded as a great pest in the immediate neighbourhood of Copenhagen, and *O. curriei*, Coq., is regarded as merely a variety of it.

A final chapter deals with the biology of the three Danish species of *Anopheles*, particularly *A. maculipennis*. The habits of this species and their bearing on the disappearance of malaria from Denmark are very fully discussed. The author concludes that the usual explanations of the disappearance of malaria (improvements in drainage, diminution of Anophelines, quininisation, etc.), are inadequate, and argues that there has been a marked change in the blood-sucking habits of *A. maculipennis* within the last century; from being mainly dependent on human blood, it has become almost exclusively an attacker of domestic animals, especially pigs, over most of Europe north of the Alps. The author attributes this supposed modification in habits in Denmark to the changes in agricultural methods that took place early in the last century, cattle being kept in increasing numbers and housed in large stables during the greater part of the year. He also remarks that this change in habits appears to have been accompanied by an increase in size of the insects, so that at the present day the non-malaria-carrying North European race may be distinguished from the still malaria-carrying South European race by its larger average size. After writing this chapter, the author found his conclusions largely confirmed by Roubaud (*R.A.E.*, B, viii, 141).

THEILER (Sir A.). **Diseases, Ticks, and their Eradication.**—*Jl. Dept. Agric., Pretoria*, ii, no. 2, February 1921, pp. 141–159.

The tick-borne diseases occurring in South Africa are briefly reviewed, and their causal agents and transmitters enumerated. These include biliary fever in horses, caused by *Nuttallia equi*, carried by *Rhipicephalus evertsi* (red tick); redwater in cattle, caused by *Piroplasma bigeminum*, carried by *Boophilus decoloratus* (blue tick); gall-sickness in cattle, caused by *Anaplasma marginale*, which has been experimentally transmitted by *B. decoloratus*, but is also carried by *Rhipicephalus* spp.; fevers caused by *Gonderia* (*Piroplasma*) *mutans*, carried by red and brown ticks (*Rhipicephalus* spp.); fevers caused by *Spirochaeta theileri*, carried by *B. decoloratus*; African Coast fever, caused by *Theileria parva*, transmitted by *Rhipicephalus* spp., including *R. simus* (black-pitted tick); heartwater in cattle, sheep and goats, caused by an ultramicroscopic organism, transmitted by the bont tick, *Amblyomma hebraeum*; biliary fever in dogs, caused by *Piroplasma canis*, transmitted by the dog tick (*Haemaphysalis leachi*) and by the brown tick (*R. sanguineus*); and a form of paralysis of sheep and lambs said to be connected with the presence of the tick, *Ixodes pilosus*. These diseases are divided into two groups, namely, those in which the animal retains the infection in the blood after recovery and acts as a reservoir of the virus, and those in which the blood of an animal that has recovered becomes sterile and harmless.

The life-histories of these ticks are given, and a list is included of important points that require elucidation. The hosts of each are enumerated and all possible methods of transmission are discussed. The prevalence of ticks in various regions and at different seasons, the number of ticks in proportion to the cattle, and the influence of climate are touched upon.

Suggestions for eradication of the ticks include the burning of grass, and it is pointed out that the later in the year this is undertaken the greater is the number of ticks destroyed. Grass-burning alone, however, will not eradicate ticks. Dipping is undoubtedly an efficient means of destroying ticks, when carried out properly with a good dip. The liquid must, however, reach the ticks, and it must be remembered that these do not always die immediately ; females may even continue to lay eggs though they do not hatch. *B. decoloratus* requires three to four weeks to complete its life-cycle on an animal, and therefore dipping must be practised every third week. *Rhipicephalus evertsi*, on the other hand, seeks its host twice, first as a larva, when it moults into a nymph and remains on the host for 16 to 21 days before dropping, and again as an adult, the female remaining on the host from 6 to 10 days. Dipping should therefore be practised at least every eighth day. Hand-dressing as well as dipping is necessary in the case of this species, owing to its habit of sheltering in the ear or under the tail, where it is protected from the dip. The brown tick (*Rhipicephalus appendiculatus*) seeks its host three times ; as a larva from three to five days, and for the same time as a nymph, while the adult female requires about a week before it drops to the ground. The best results are therefore obtained if dipping is repeated every third day, and continued as long as the different stages can live in the grass, that is, at least a year. The case of *A. hebraeum* is very similar, and dipping should be practised at least about every four days for this species. Dipping should be most regularly and energetically carried on through the summer, when changes in tick-life are more rapid. The dips recommended are those designed by Pitchford in Natal, as follows :—

	3 days Interval.	7 days Interval.	14 days Interval.
Sodium arsenite, 80%	4 lb.	8 lb.	12 lb.
Soft soap	3 lb.	3 lb.	6 lb.
Paraffin	1 gal.	2 gal.	2 gal.
Water	400 gal.	400 gal.	400 gal.

The method of preparation of the dip is described, and it is suggested that a dip-tester or isometer is advisable in order to maintain a constant strength. Cattle should be gradually accustomed to the dip by using a weaker solution first, and then a stronger one. If a rapid reduction of ticks to the minimum is desired, horses, goats, and sheep should also be dipped. Animals that cannot be dipped should be sponged and dressed at intervals, and as a supplementary measure all animals should be sponged with the dipping liquid on those parts of the body where the dip does not penetrate by the ordinary method.

The method of starving ticks by keeping certain areas free from animals for a definite period is described. The eradication of diseases in which the animals do not act as a reservoir of the virus, namely, African Coast fever and heartwater, can be accomplished by keeping them for the requisite time, *i.e.*, for African Coast fever about 18 days, in a clean quarantine area ; after this the nymphs will have dropped off to moult, and the animals should be removed to another clean area, and after another 18 days to repeat the process they may be safely moved into a clean area, having ceased to be infective. After a period of 15 months the original pasture will have become tick-free, and the animals can be moved back there. For heartwater, two quarantine periods of three to four weeks each will be sufficient.

For those diseases in which the animal remains infective—*i.e.*, biliary fever, redwater and gall-sickness—tick eradication is essential, and dipping is the better method. Since practically the whole of Africa is infected with redwater and gall-sickness, moving of cattle is of little use.

For the eradication of the ear-tick (*Ornithodorus megnini*), dipping is useless, and affected animals require hand-dressing. A better method of attacking the ticks is to destroy the hiding-places of the adults, by leaving them unused for as long as three years. The erection of bush kraals, which are easily destroyed, or of simple wire kraals that can be removed, would be a simple expedient.

The failure to eliminate African Coast fever after 12 years or more of dipping is considered to be due to lack of regular and systematic procedure. Dipping is such a certain cure for the disease that the fear of it has disappeared, and remedial measures tend to be neglected.

HILDEBRAND (S. F.). **On the Occurrence of** *Aëdes sollicitans* **in Fresh Water polluted by Acid Waste.**—*Science, Lancaster, Pa.*, liii, no. 1364, 18th February 1921, p. 163.

Attention is drawn to the occurrence of *Ochlerotatus* (*Aëdes*) *sollicitans* in fresh water polluted by acid waste from a guano factory. All other animal life appeared to be extinct, the acid content of the water being estimated at fully 3 per cent. The larvae occurred most frequently along the edges of the ditches among decaying vegetation, and appeared to be more resistant to the effects of oiling than *Culex* or *Anopheles* occurring in less polluted portions of the same ditches.

LEISHMAN (Sir W. B.). **On an experimental Investigation of** *Spirochaeta duttoni*, **the Parasite of Tick Fever.**—*Jl. R. A.M.C., London*, xxxvi, no. 3, March 1921, pp. 161–186.

The author considers that the life-history of *Spirochaeta duttoni* is probably as follows. Starting from a patient suffering from tick fever, whose blood contains *S. duttoni* and who is bitten by a tick [*Ornithodorus moubata*] the spirochaetes taken into the intestinal tract of the tick lose their mobility, and many undergo structural changes such as the formation of granules and the extrusion of buds. The spirochaetes rapidly disappear, few being left by the eighth or tenth day. The granules are liberated, probably by the breaking down of the spirochaetes, persist throughout the life of the tick, and are to be found at times in the intra-ovarian eggs, as well as in the young nymphs hatched from them. In the young nymphs they are capable of multiplying, sometimes to an enormous extent.

Under certain conditions, of which high temperature is one, though probably not the only one, spirochaetes tend to reappear in the tick about ten days after feeding.

These young spirochaetes arise from granules and tend to persist throughout the life of the tick, and there is some reason to think that it is this form, or the granule stage immediately preceding it, that is most infective.

It appears probable that the relapse in man and animals may be due to the development of fresh crops of spirochaetes from granules formed by the organism that caused the first attack [*cf.* *R.A.E.*, B, vi, 138].

Observations upon other pathogenic spirochaetes make it probable that a similar cycle of development is common to them all.

MacArthur (W. P.). **An Abnormal Development of** *Calliphora erythrocephala.*—*Jl. R.A.M.C., London,* xxxvi, no. 3, March 1921, pp. 232–233.

Of several thousand examples of *Calliphora erythrocephala* that were bred for experimental purposes, six were observed to develop in a peculiar manner, the normal position within the puparium being reversed, and the head of the imago directed towards the posterior spiracles. The pupal case ruptured at the usual site, but none of the insects managed to free themselves. In 500 pupae subsequently dissected, one insect was found lying reversed in this manner.

Newstead has described a similar occurrence in the case of *Auchmeromyia luteola,* but this phenomenon does not appear to have been recorded for any other species of Muscids. Experiments are being carried out with the object of ascertaining the cause of this remarkable development.

Pierce (W. D.). **Lectures in Applied Entomology : Vol. 1. The General Subject of Applied Economic Entomology.**—*Denver, Colorado,* The Mineral Metal and By-Products Company, 1920–21, 220 pp. multigraph.

This is the first volume of a course of lectures on Applied Entomology. The course is not designed to deal with injurious and beneficial insects in the manner of an ordinary text book, but rather with methods and principles. The average entomologist has, owing to the vastness of the science, been forced to specialise on only a limited part of economic entomology, and so requires a concise summary of the field before him in order that he may render the best service.

The first volume of the course comprises ten lectures on general aspects of the subject, including one on the entomologist in relation to sanitation.

Hearle (E.). **The Larva and Breeding-place of** *Aëdes aldrichi,* **Dyar and Knab. (Culicidae, Diptera).**—*Canad. Ent., London, Ont.,* liii, no. 2, February 1921, p. 48.

Aëdes aldrichi breeds in wooded river bottoms in the Lower Fraser Valley in British Columbia. During flood time these areas are converted into temporary swamps. *A. aldrichi* is the chief species found, but *A. vexans* and *A. cinereus* also occur.

Gill (C. A.). **The Influence of Humidity on the Life-history of Mosquitoes and on their Power to transmit Infection.**—*Trans. R. Soc. Trop. Med. & Hyg., London,* xiv, no. 5, 21st January 1921, pp. 77–83.

The experiments here described were carried out in India with *Culex fatigans* and bird malaria (*Proteosoma grassii*). They indicated that a mean relative humidity of not less than 48 per cent. (at a temperature of 27°C. [80·6°F.]) is essential to the existence of *C. fatigans* for a period of five days, and that any lower degree of relative humidity will cause the transmission of bird malaria to cease owing to the premature death of the insect host. Relative humidity does not appear to exert any direct influence on the degree of infection, or the rate of development of the sexual parasite of bird malaria in the mosquito.

It was noticed that the mosquitos did not feed when the daily mean humidity was less than 40 per cent., and fed readily when it was over 50 per cent. Again, it was the custom to clear the house of mosquitos in the evening by lighting the verandah and darkening the rooms, when the insects would stream out, but on one particular night which was hot, dry and windless, the usual procedure was reversed—no mosquitos attempted to go out, while numbers began to enter the house.

Temperature exerts a direct effect on the malaria parasite in the mosquito, low temperature inhibiting the growth of the oocyst, while its rate of development is dependent upon the mean temperature. *C. fatigans* can live at a wide range of temperature, but at low temperatures its vital functions are restricted.

With regard to malaria in general, it is probable that the factors of relative humidity and temperature require to be somewhat delicately adjusted in order that a period of potential infection may occur. Thus a rise in mean temperature, which otherwise might be favourable to the transmission of malaria, may occasion a fall in relative humidity which will cause the cessation of infection. Similarly a fall in mean temperature, in spite of a concomitant rise in relative humidity, may have a like effect.

These considerations may explain the occurrence in a locality of numerous Anophelines and many human carriers together with a complete absence of new infections; or the occurrence of new infections in localities where Anophelines and human carriers are relatively few.

A point of immediate practical importance is that, with a knowledge of the lower limit of temperature and humidity necessary to create a period of potential infection, it is possible in the case of any area for which the necessary meteorological data are available, to determine the season of the year and the precise duration of the period during which malaria may be acquired.

Mackenzie (F.). **Sheep-Management Notes.**—*N. Z. Jl. Agric., Wellington,* xxii, no. 1, 20th January 1921, pp. 41–42.

The importance of dipping sheep is emphasised, and the precautions necessary for successfully carrying out the operation are dealt with.

Dyar (H. G.). **A new Mosquito from East Africa (Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus, Washington, D.C.,* ix, nos. 4–6, April–June [issued 28th Feb.] 1921, pp. 51–52, 1 fig.

Aëdes (*Ecculex*) *rhecter*, sp. n., is described from Portuguese East Africa.

Dyar (H. G.). **The American** *Aëdes* **of the** *punctor* **Group (Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus, Washington, D.C.,* ix, no. 4–6, April–June [issued 28th Feb.] 1921, pp. 69–80, 1 plate.

The author proposes to substitute the subgeneric name *Ochlerotatus* for the group of *Aëdes* treated by him as *Heteronycha* [*R. A. E.*, B, ix, 9] to conform with the usage of European authors and for a number of other reasons. The *punctor* group of this subgenus may be divided into two series, the *punctor* series proper, in which the spine on the basal lobe of the side-piece of the male hypopygium is a normal one, and the *spenceri* series, in which the spine is modified. The first series is represented in the north European fauna almost species by species with the American; the second series is not, as far as is known, represented in Europe at all.

Of the species of this group described, *Aëdes* (*Ochlerotatus*) *dysanor*, from the eastern United States, is new.

Bonne-Wepster (J.) & Bonne (C.). **The First** *Sabethes* **Larva found (Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus, Washington, D.C.*, ix, no. 4–6, April–June [issued 28th Feb.] 1921, pp. 98–99.

The hitherto unknown larva and pupa of *Sabethes bipartipes*, D. & K., are here described. The larvae were found in Surinam, in the water of a hole in a fallen tree, feeding on *Culex coronator*, D. & K., *C. bonneae*, D. & K., *C. mollis*, D. & K., and even *Uranotaenia lowii*, Theo. Three adult females were bred from them.

Dyar (H. G.). **Two New** *Culex* **from Costa Rica (Diptera, Culicidae).** *Insecutor Inscitiae Menstruus, Washington, D.C.*, ix, no. 4–6, April–June [issued 28th Feb.] 1921, p. 100.

Culex (*Choeroporpa*) *pasadaemon* and *C.* (*C.*) *merodaemon*, both from Costa Rica, are described.

Chandler (S. C.). **Salt Marsh Mosquitoes Far Inland.**—*Jl. Econ. Ent., Concord, N.H.*, xiv, no. 1, February 1921, p. 141.

Anopheles crucians, Wied., and *Aëdes sollicitans*, Wlk., have been taken far from the coast in southern Illinois, but the area is probably underlaid with salt, thus approximating sea-coast conditions.

Klein (W.). **Schwere Räude bei Schafen durch die Akarusmilbe** (*Demodex folliculorum*). [Severe Sheep Mange due to *D. folliculorum*.]—*Deutsche Tierärztl. Wochenschr., Hanover*, xxix, no. 9, 26th February 1921, pp. 105–106.

Mange due to the mite, *Demodex folliculorum*, is recorded in two large flocks of sheep.

Nandin (L.). **Canine Piroplasmosis transmitted by Fleas.**—*Rev. Gén. Méd. Vet.* (Abstract in *L'Agric. Colon., Florence*, xv, no. 2, February 1921, p. 117.)

The author concludes from observations that *Piroplasma canis* may be transmitted by fleas in marshy regions, especially in the Mediterranean region. Trypanblue is an effective remedy.

Tonnoir (A.). **Une Nouvelle Espèce européenne du Genre** *Phlebotomus* (*Phlebotomus ariasi*).—*Ann. Soc. Ent. Belgique, Brussels*, lxi no. 2, 4th March 1921, pp. 53–56, 3 figs.

Phlebotomus ariasi, sp. n., is described from Barcelona.

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WILHELMI (J.). **Versuche zur Bekämpfung der in Kot, Mist und anderen organischen Abfallstoffen lebenden Muscidenbrut, insbesondere der gemeinen Stechfliege, mit Kalisalzen und anderen Chemikalien.** [Experiments with Potassium Salts and other Chemicals against the Eggs and Larvae of Muscid Flies, especially *Stomoxys calcitrans* in Faeces, Dung and other organic Waste.]—*Mitt. Landesanstalt Wasserhygiene, Berlin-Dahlem,* 1920, no. 25, p. 190. (Abstract in *Biedermann's Centralbl., Leipsic,* l, no. 2, February 1921, pp. 71–73.)

These laboratory experiments were made with *Stomoxys calcitrans, Musca domestica,* and *Lyperosia irritans* ; fresh cattle dung was used, the several chemicals being mixed with it. Slaked lime, borax and gas lime, added at the rate of $\frac{1}{320}$, $\frac{1}{160}$, and $\frac{1}{80}$, respectively, killed the larvae and prevented the development of the eggs in cattle dung.

BOUILLIEZ (M.). **Au Sujet de la Communication de M. Muraz sur un Foyer de Trypanosomiase humaine à Tchoa (Tchad).**—*Bull. Soc. Path. Exot., Paris,* xiv, no. 2, 9th February 1921, pp. 57–58.

With reference to Muraz's communication [*R. A.E.*, B, ix, 58], the author points out that this centre of human trypanosomiasis was reported by him in 1916 [*R. A.E.*, B, iv, 84]. There is no doubt, however, that sleeping sickness has increased considerably in that locality since that date.

SERGENT (ED.) & SERGENT (ET.). **Etude expérimentale du Paludisme. Paludisme des Oiseaux** (*Plasmodium relictum*).—*Bull. Soc. Path. Exot., Paris,* xiv, no. 2, 9th February 1921, pp. 72–78.

For the purpose of an experimental study of preventive quininisation the authors made use of *Plasmodium relictum*, causing avian malaria. They find that preventive quininisation gives the results of acclimatisation to the disease. It permits the avoidance of the acute stage, only allowing a latent infection that confers a relative immunity.

Preventive quininisation is useless before there is danger of infection, but should be practised immediately there is any risk of infective mosquito bites, and it should be continued without interruption.

Several other drugs were tried, but none gave the results obtained with quinine, either in preventive or curative treatment.

In commenting on this paper, M. Laveran regrets the use of the term "avian malaria," as it appears certain that *P. relictum* is distinct from the organism causing malaria.

PRINGAULT (E.) & VIGNE (P.). **Sur quelques Cas de Parasitisme par** *Rhipicephalus sanguineus,* **Latreille, 1806.**—*Bull. Soc. Path. Exot., Paris,* xiv, no. 2, 9th February 1921, pp. 91–93.

A case of pruritus evidently due to *Rhipicephalus sanguineus,* Latr., found on the patient, is recorded from France. The patient stated that other persons on the same farm were also affected, and that the trouble appeared after a wild boar had been killed that was covered with similar ticks.

Some authors maintain that the pruritus produced by ticks is due to the rostrum being left in the skin, but the three specimens examined were intact, and furthermore the parts of the body that were affected were not those on which the ticks were found.

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LEGENDRE (J.). **Plan de Campagne antipaludique pour Madagascar.**—*Bull. Soc. Path. Exot., Paris,* xiv, no. 2, 9th February 1921, pp. 97–100.

In previous papers [*R.A.E.*, B, ii, 86; vi, 157] the author showed that rice-fields and swamps, etc., especially the former, harboured the malaria mosquitos, *Anopheles* (*Cellia*) *squamosus* and *A.* (*C.*) *pharoensis*, that the spleen-index of school children at Antananarivo increased according to the situation of their dwellings, and that the lower figures are due to the presence of mosquito-destroying fish in rice-fields in the plains, whereas rice-fields on the hill-sides have no fish.

The measures required include anti-larval work, the prohibition of certain crops needing irrigation [*loc. cit.*], and quinine prophylaxis. The anti-larval work must include an ordered system of rice-field irrigation, in which provision should be made for rapidly drying the fields after harvesting. This was enforced for agricultural reasons in the days before the French occupation, and is valuable against the last generations of larvae. Pisciculture should be encouraged, and the natives should be shown that crops more remunerative than rice can be grown on the hill-sides.

ROUBAUD (E.). **Les Diptères et la Pathologie exotique.**—*Bull. Soc. Path. Exot., Paris,* xiv, no. 2, 9th February 1921, pp. 58–65.

The rôle played by Diptera in connection with disease was rapidly reviewed in the course of this informal address to the Société de Pathologie exotique.

VELU (H.). **La Piroplasmose bovine au Maroc et ses Rapports avec les Piroplasmoses circumméditerranéennes.**—*Bull. Soc. Path. Exot., Paris,* xiv, no. 2, 9th February 1921, pp. 116–124.

The forms of piroplasmosis in the Mediterranean region are rarely pure strains. The haemoglobinuria of Central and Northern Europe is exclusively due to *Piroplasma bigeminum* or *P. bovis,* and African Coast fever exclusively to *Theileria parva,* while the piroplasmoses of the Mediterranean basin are caused by associated parasites (*P. bigeminum* and *Theileria mutans, P. bigeminum* and *Anaplasma marginale, T. parva* and *T. mutans*), of which the types *T. parva* and *T. mutans* seem to be peculiar to this region.

The presence of *T. mutans* has been recognised in Eritrea, and piroplasms resembling it have been found in cattle from Tunisia. On the White Nile *T. mutans* has been found associated with *A. marginale.* In the region of Trebizond cattle from Russia showed mixed infections of *P. bigeminum, T. annulata,* and *A. marginale. T. mutans* and *P. bigeminum* are said to be associated in Greek cattle. It is possible that not *P. bigeminum,* but one of the pyriform organisms, such as have been reported from various parts of the world, was concerned.

In Morocco bovine piroplasmosis seems to be a pure infection, permitting accurate research on the agents and their carriers, and thus helping towards the solution of the problem of preventive immunisation.

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MARTINI (E.). **Die biologische Malariabekämpfung in Mazedonien.** [Biological Anti-malaria Work in Macedonia.]—*Zeitschr. angew. Ent., Berlin,* vii, no. 2, February 1921, pp. 225–286, 7 figs.

This paper describes in a comprehensive manner the anti-mosquito measures on the German Balkan front, from February 1918 until the retreat of September 1918 stopped all work and resulted in the loss of a large mass of valuable material.

Descriptions are given of the country and the dwellings found in it, the mosquito fauna, the malaria incidence and the organisation created to combat it, anti-malaria methods, mechanical protection against mosquitos, measures against mosquito larvae, and methods of dealing with the breeding-places.

A list of the species of mosquitos met with has already been noticed [*R.A.E.*, B, ix, 20]. *Anopheles maculipennis*, Mg., is the commonest species. It begins breeding at the end of March in warm localities and in April in more northern and higher situations. In suitable places all sizes of larvae occur in increasing numbers throughout the summer, without however a corresponding increase in the adults, owing to the disappearance of many breeding-places as summer advances. Thus adults may be abundant in July and scarce in August. The larvae occur in all kinds of water, from that in hoof-marks to large rivers or lakes, but never in an actual current or open space, shelter being sought not only against disturbance but also against natural enemies. Artificial collections of water are likewise infested, but stagnant water and pools thickly covered with duck-weed are avoided. Warmth does not appear to affect the larvae. The larvae are regularly associated with those of *Culex hortensis*, Fic.

The larvae of *A. bifurcatus*, L., seem even more particular as to the freshness of the water. This species is not very numerous, probably owing to deforestation. It has been observed as high up as 5,000 feet.

Only the western variety (*pseudopictus*) of *A. hyrcanus*, Pall. (*sinensis* Wied.) was found, and then it was taken once only, near Gevgeli. As the latter is an important commercial centre, it is possible that this individual was an imported one.

A. palestinensis, Theo., is second in abundance to *A. maculipennis*, but was not found in the northern part of the territory, though it may possibly occur there. Its altitude range is also less than that of *A. maculipennis* and *A. bifurcatus*, and it seems to require more warmth. Its chief breeding-places are in the warm region of the lower Varda. It is found in the quiet bays of swift-flowing streams, but at the bottom of large valleys it occurs in slow-moving water full of algae. The latter places are scarcely suited to *Culex mimeticus*, Noé, which otherwise is constantly associated with it, so that these two species are less closely connected than are *A. maculipennis* and *C. hortensis*. The fertilised females of *A. palestinensis* sometimes hibernate, but the species is scarce in spring and the heavy rains appear to destroy entire broods during the early warm weather. After the rains, *A. palestinensis* rapidly increases, and it may predominate locally over *A. maculipennis*. This seasonal difference between it and *A. maculipennis* is of some practical importance if it be remembered that benign tertian malaria is at its height in spring and malignant tertian in autumn. Measures against malignant tertian and those against *A. palestinensis* would therefore appear to be of equal importance in many districts. Lack of opportunity prevented careful investigation of another observation, namely, that both malignant tertian and *A. palestinensis* appear to have the same distribution in area and altitude.

A. plumbeus, Hal. (*nigripes*, Staeg.) occurs, but is unimportant.

Uranotaenia unguiculata, Edw., occurred in a ditch containing *Culex pipiens*, L., in abundance. *C. pipiens* is common everywhere, especially in water-barrels and dirty ditches. The larvae were seldom found in dwellings and cattle-sheds swarming with the adults.

The larvae of *C. hortensis* are common throughout Macedonia from early spring onwards, appearing before *A. maculipennis*, with which this species is associated; it is, however, seldom seen in artificial collections of water. Its altitude distribution is about the same as that of *A. maculipennis*. Macedonia is rich in wild-fowl, and it is possible that the greatest abundance of *C. hortensis* coincides with their breeding-time. *C. hortensis* seems less of a domestic species than *C. pipiens* and more dependent on wild than on domestic birds.

C. mimeticus does not appear to be very closely connected with *A. palestinensis*, and rarely occurs in the warm bottoms of valleys; it has been found at altitudes of about 4,000 feet and reaches farther north than the Anopheline. It appears to be most common at midsummer. *Theobaldia annulata*, Schr., occurs throughout the territory in the same waters as *C. pipiens*, though very foul water is avoided. It is less abundant than *C. pipiens* in barrels, ditches, etc. *T. longiareolata*, Mcq. (*spathipalpis*, Rond.) is also common in the same places, but appears to prefer cleaner water. *Taeniorhynchus richiardii*, Fic., was taken once only, and is probably an imported species. Some specimens of *Ochlerotatus* (*Aëdes*) *communis*, De G., (*nemorosus*, Mg.) were taken in the beech forest of the Leschnica valley at about 5,000 feet above-sea-level. *Finlaya geniculata*, Ol. (*A. ornatus*, Mg.) was also found in the same locality. In Germany complaints of a mosquito nuisance only occur where species of the genus *Ochlerotatus* are present, and although *Culex* and *Anopheles* were breeding nearly everywhere in the Balkans, it was only where *Ochlerotatus* occurred that complaints were made. The larvae of *Ochlerotatus caspius*, Pall. (*A. dorsalis*, Mg.) were universally common in the spring, though less so south of Uskub. They even occur in water almost too muddy for any other species, such as ruts constantly touched by passing traffic. A few larvae of *Ochlerotatus* (*A.*) *vexans*, Mg., were taken from a pool near Uskub in which *O. caspius* abounded.

The restricted development of *Ochlerotatus*, as compared with *Culex* and *Anopheles*, is very noticeable. It appears to be due to the character of the country, its climate, and its lack of forests and meadows.

MORSTATT (H.). **Die Rolle der tierischen Parasiten und Krankheitsüberträger im ostafrikanischen Feldzuge.** [The Rôle of Animal Parasites and Disease Carriers in the East African Campaign.]—*Zeitschr. angew. Ent., Berlin,* vii, no. 2, February 1921, pp. 287–295.

In the East African campaign the part played by diseases is comparable with that reported in earlier wars. After quoting from English and Portuguese reports, the author gives his own observations on the distribution and importance of the various parasites and disease carriers. Malaria was the commonest and most important disease during the campaign, especially in the rainy season. Severe benign tertian appears to have steadily increased, and blackwater fever caused many deaths.

Of the five East African species of *Glossina*, *G. morsitans* is the commonest and most widely distributed; it is sometimes replaced by *G. pallidipes*, or both may occur together. *G. brevipalpis* is also widespread. *G. austeni* occurs in the north of Tanganyika Territory and in British East Africa, and *G. palpalis* is confined to the lake region. The author is not aware of any war-time observations on the spread of sleeping sickness by *G. palpalis*.

The midges *Culicoides* (*Ceratopogon*) spp., are able to pass mosquito netting, and their bites cause an itching occasionally very troublesome to troops on the coast. Though no species has been accurately determined, it is certain that *Phlebotomus* occurs, and the author records sandfly fever from Dar-es-Salaam.

Other pests were the Muscids, *Cordylobia anthropophaga* and *Auchmeromyia luteola*; fleas, which seldom infested Europeans, except in deserted camps, no cases of plague occurring among the troops; and the sand-flea, *Tunga* (*Dermatophilus*) *penetrans*, L., which at times was a serious pest.

Prior to the war only natives were infested with lice, but during the operations Europeans were affected, especially as a result of night marches, when direct contact with natives could not always be avoided. The head-louse was never seen, and *Phthirus pubis* was noticed in a very few cases only.

Ornithodorus moubata is the only relapsing-fever tick in East Africa; there were several European cases of the fever, but none proved fatal. Of other ticks, *Rhipicephalus* spp., the carriers of African coast fever, are the most harmful.

Mühlens (P.). **Beobachtungen über das Verhalten der Malariaparasiten in der Anophelesmücke.** [Observations on the Behaviour of the Malaria Parasite in the Anopheline Mosquito.]—*Arch. Schiffs- u. Tropen-Hyg., Leipsic*, xxv, no. 2, March 1921, pp. 58–61, 5 figs.

Crescents have been found in the musculature of *Culex* artificially infected with *Proteosoma* [see following paper]. Similar researches by the author have proved negative. On the other hand, in sections of *Anopheles maculipennis* artificially infected with *Plasmodium vivax*, conditions were found corresponding to those observed by Mayer with *Proteosoma*.

On 13th October 1919 mosquitos were fed on a tertian case and then confined in a temperature of 23–25° C. (73–77° F.). Individuals that died or were killed from 3rd to 5th November were cut into sections and stained; six out of eight were infected and showed sporozoites in various parts of their bodies, but neither cysts nor signs of cysts were visible in the stomachs.

Grassi believed that crescents collect around the salivary glands, but this was certainly not so in this case, for no remains of stomach cysts were visible 21 days after infection, and therefore the cysts must have burst and released the sporozoites some days previously. Most of the crescents must have passed into the blood stream.

Though no success has hitherto attended attempts to prove the hibernation of the malarial organism in Anophelines, it is possible that the discovery of crescents in the musculature, and especially in the palpi and scutellum, may indicate these to be the places where the sporozoites hibernate, and from which the crescents move to the salivary glands in spring. Experiments in this connection can only be carried out in a climate in which Anophelines can live for a long period.

MAYER (M.). **Wanderung der Malariasichelkeime in den Stechmücken und die Möglichkeit der Ueberwinterung in diesen.** [The Movements of Malaria Crescents in Mosquitos and the Possibility of their Hibernation in the latter.]—*Med. Klinik,* 1920, no. 50. (Abstract in *Arch. Schiffs- u. Tropen-Hyg., Leipsic,* xxv, no. 2, March 1921, pp. 64–65.)

Assuming that sporozoites in mosquitos might hibernate in places other than the salivary glands, the author infected *Culex* with *Proteosoma* in the autumn of 1919 with the intention of allowing the mosquitos to hibernate. This was not possible, and earlier examinations had to be made. When four or five weeks had elapsed after infection, sporozoites were found in the salivary glands and in the thoracic, head, and leg muscles, and especially in the palpi. A second series of these mosquitos was examined 48–52 days after infection, and only a few isolated individuals were found in the muscles; those in the salivary glands already showed signs of degeneration, and there were no sporozoites in the ovaries.

NICOLLE (C.), CUENOD (A.) & BLANC (G.). **Transmission of Trachoma by Flies.**—*Presse Méd.,* 20th December 1919. (Abstract in *Ann. d'Igiene, Rome,* xxxi, no. 1, January 1921, p. 66.)

Flies that have been in contact with eyes infected with conjunctivitis are able to transmit the disease for at least 24 hours, and this is also the case if they have touched infected bandages within six hours of their removal from the affected eye.

PARAF (J.). **The Spread of Bacillary Dysentery by Flies.**—*Rev. d'Hyg. et de Police sanitaire,* 1920, p. 24. (Abstract in *Ann. d'Igiene, Rome,* xxxi, no. 1, January 1921, p. 66.)

During an epidemic of dysentery at Vineuil, the dysentery bacillus was found in 12 out of 30 flies captured near the latrines, and in 7 out of 36 captured in wards where cases of dysentery occurred. At table, 3 out of 38 flies harboured the bacillus. Milk for surgical cases contained it 6 times out of 26, and bread, once in 12 times.

Experiments were made to ascertain whether flies spread dysentery more readily by means of their feet or by their dejecta. Tests with artificially infected flies showed that the feet were infected twice out of 16 times and the intestine 11 times out of 24. The bacillus remains in the intestine up to five days after the first infection.

PRICOLO (A.) & FERRARO (G.). **The Identification of the Trypanosomes in the Colony of Eritrea.**—*Clinica Veterinaria, Milan,* 29th February 1920. (Abstract in *Rev. Vet. e Zootechnia, Rio de Janeiro,* x, no. 2, 1920, pp. 120–121.) [Received 28th March 1921.]

The trypanosome found in Eritrean camels is *Trypanosoma evansi* [*R.A.E.,* B, vii, 131]; this form also infects equines. Bovines are attacked by *Trypanosoma vivax-uniforme.* There is no reason for supposing that under natural conditions *T. evansi* occurs in bovines or *T. vivax-uniforme* in camels and equines, though under experimental conditions the camel is susceptible to the latter.

PARROT (L.). **Sur une Variété nouvelle de** *Phlebotomus minutus,* **Rond.**—*Bull. Soc. Hist. Nat. Afrique du Nord, Algiers,* xii, no. 2, 15th February 1921, pp. 37–40, 1 fig.

A description is given of *Phlebotomus minutus,* Rond. var. *fallax,* n., from Algeria and Tunisia. The characters differentiating this variety from the type of *P. minutus,* Rond., and from *P. minutus* var. *africanus,* Newst., are described.

NAKANO (H.) & TAKAUGI (S.). **Dermatitis due to the " Karasoss."**—*Hifukwa, Hitsunyokwa Zasshi* [Jap. Jl. Dermatol. & Urol.], xviii, no. 3, 20th March 1918, pp. 1–9. (Abstract in *China Med. Jl., Shanghai,* xxxv, no. 1, January 1921, p. 74.)

A mite, probably the larva of a species of *Trombidium,* found under leaves in wet, shaded regions, infests the human skin causing itching and the local appearance after two or three days of small reddish spots, which persist for five or six days. If it penetrates under the skin, the inflammation spreads.

Treatment consists of applications of balsam of Peru and of sulphur.

HEGNER (R. W.). **The Relation of Medical Zoology to Public Health Problems.**—*Jl. Amer. Med. Assoc., Chicago,* lxxv, 11th December, 1920, pp. 1607–1610.

The importance of medical zoology in relation to public health is emphasised, and the work of the school of Hygiene and Public Health of the Johns Hopkins University in this direction is briefly outlined.

HEGNER (R. W.). **Medical Zoology in Europe.**—*Science, Lancaster, Pa.,* N.S. lii, no. 1356, 24th December 1920, pp. 591–597.

A short description is given of the institutions working on the various branches of medical zoology in Belgium, England, France, Italy, Monaco and Switzerland. The author lays considerable stress on the effect of the War, in spite of the stimulus it has given to certain phases of medical zoology, in depleting the supply of young men, and reducing the funds available for scientific work, both directly and owing to the unfavourable exchanges.

CARTER (H. F.). **The Occurrence of** *Theobaldia arctica,* **Edw., in England.**—*Entomologist, London,* liv, no. 693, February 1921, pp. 39–40.

Theobaldia arctica, Edw., is recorded from Cheshire. The occurrence of this mosquito so far south emphasises the need for more consistent and detailed work in connection with indigenous mosquitos in Britain.

CHAPIN (E. A.). **Remarks on the genus** *Hystrichopsylla,* **Tasch., with Description of a New Species (Siphonaptera.)**—*Proc. Ent. Soc. Washington, D.C.,* xxiii, no. 2, February 1921, pp. 25–27.

Hystrichopsylla mammoth, sp. n., taken from *Aplodontia californica* in California is described, and a key to the four known species of the genus is given.

Arkwright (J. A.) & Bacot (A.). **A Bacillary Infection of the Copulatory Apparatus of** *Pediculus humanus.*—*Parasitology, Cambridge,* xiii, no. 1, March 1921, pp. 25–26.

During observations made on the association of *Rickettsia* with trench fever [*R.A.E.*, B, vii, 146], a bacillary infection of the excreta and gut of lice (*Pediculus humanus*) was noticed. Subsequent experiments, here described, show this organism to be a parasite of the copulatory apparatus of *P. humanus,* for which the name *Bacillus pediculi* is suggested.

Arkwright (J. A.), Atkin (E. E.) & Bacot (A.). **An Hereditary** *Rickettsia*-**like Parasite of the Bed Bug** (*Cimex lectularius*).—*Parasitology, Cambridge,* xiii, no. 1, March 1921, pp. 27–36, 2 plates.

A new parasite discovered in the gut of *Cimex lectularius* has been tentatively named *Rickettsia lectularia.* The hereditary character, cultivation and development of this parasite are described, and the known species of *Rickettsia* are reviewed. *Cimex hirundinis* is also parasitised by an organism that may prove to be a hereditary infection.

Hoare (C. A.). **Some Observations and Experiments on Insect Flagellates, with special Reference to artificial Infection of Vertebrates.**—*Parasitology, Cambridge,* xiii, no. 1, March 1921, pp. 67–85.

The relation of *Crithidia melophagi,* Flu, to the sheep trypanosome *Trypanosoma melophagi* is discussed [*cf. R.A.E.*, B, viii, 45]. Attempts to infect mice artificially with *Crithidia melophagi* from *Melophagus ovinus, Herpetomonas jaculum* from *Nepa cinerea,* and *H. calliphorae* from *Calliphora* sp., proved negative. The flagellates also proved non-pathogenic to fish (*Gasterosteus aculeatus*), both when administered as food and when inoculated. Although the experiments here described do not disprove those of Laveran and his collaborators, they show that further study is required before general conclusions as to the pathogenicity of insect flagellates and their relation to leishmaniasis can be formed.

Riley (W. A.). **An annotated List of the Animal Parasites of Foxes.**—*Parasitology, Cambridge,* xiii, no. 1, March 1921, pp. 86–96.

This list of parasites of foxes has been compiled in view of the rapidly growing importance of breeding foxes for their fur, especially in North America and Japan.

The Arthropod parasites recorded are :—Acarids, *Demodex folliculorum,* Sim., *Sarcoptes scabiei vulpis,* Fürst., and *Dermanyssus gallinae,* De G. ; Ixodids, *Amblyomma americanum,* L., *A. tuberculatum,* Marx, *Dermacentor variabilis,* Say, *Haemaphysalis bispinosa intermedia,* Warb. & Nutt., *H. cinnabarina punctata,* C. & F., *H. inermis,* Bir., *H. leachi,* Aud., *Ixodes canisuga,* Johnst., *I. hexagonus,* Leach, *I. marxi,* Banks, *I. ricinus,* L., and *Rhipicephalus sanguineus,* Latr. ; Mallophaga, *Trichodectes quadraticeps,* Chapm., and *T. vulpis,* Denny ; Siphonaptera, *Pulex irritans,* L., *P. pallidus,* Tasch., *Ctenocephalus canis,* Curt., *Ceratophyllus melis,* Walk., and *Chaetopsylla vulpes,* Motsh.

Swynnerton (C. F. M.). **An Examination of the Tsetse Problem in North Mossurise, Portuguese East Africa.**—*Bull. Ent. Res., London*, xi, pt. 4, March 1921, pp. 315–386, 9 plates, 1 map.

The important investigations here described, which should be consulted in the original, were concerned chiefly with *Glossina morsitans*, *G. pallidipes* and *G. brevipalpis*, though *G. austeni* is also noticed. The Mossurise fly problem is of particular interest, not only because of the presence in the district of so many different species of *Glossina* and the very varied conditions of vegetation, elevation, rock-formation, etc., that affect them, but also because part of the area was, under the Zulu domination, the scene of an artificially directed scheme of settlement that resulted in the banishment of tsetse-flies. This indicates that settlement, properly planned, is itself capable of clearing the country affected of the two flies here concerned—*G. brevipalpis* and *G. pallidipes*.

Other points to which particular attention was given were an analysis of the vegetation, and of the distribution and local behaviour of the various woodland types. Each species of *Glossina* is dependent on particular but different shade conditions, and a knowledge of the types of woodland that provide these conditions and their response to seasonal and other influences, burning, etc., is essential for any clearing operations that may be undertaken in the future. A very large amount of information was also collected concerning the habits of the various tsetse-flies, the types and distribution of the animals on which they feed, the methods and extent of their spread, their natural enemies, etc.

Experiments were made in clearing the undergrowth in various ways, and its effect on the several species of *Glossina*. Cattle were taken successfully through a fly belt when the bush on each side of the road had been cleared, and also by means of decoy animals so placed with regard to the more valuable ones that the latter were not attacked.

But perhaps the most important of the recommendations made as a result of these investigations concerns the particular form of clearing produced by regulated burning. The Zulus used to regulate burning for hunting purposes, but under European administration everyone burns when he pleases. Irregular burning means that when the later fires take place the areas burned earlier are already becoming fit for the reception of the fly. A still worse effect is the encouragement given by too early burning to the wooding, and particularly to the formation of the thickets on which *G. brevipalpis* rather specially depends. Late burning, on the other hand, finds the grass and fallen leaves at their driest and achieves much actual destruction of young growth, and a temporary destruction of much high shade as well, at a hot, dry time that must be relatively critical for the fly. Late burning is not an emergency measure, but would have to be kept up annually. Apart from varying grass conditions, its effect should show first and chiefly in relation to *G. brevipalpis*, and, in the area where it depends mainly on coppice, *G. pallidipes*. Its effect in relation to *G. morsitans* is less certain, as that fly and *G. pallidipes* in the same wooding appear to be independent of undergrowth ; but the process will assuredly tell, as the established fire-resisting trees pass maturity with nothing to replace them.

Close settlement, as mentioned above, involving effective clearing, will protect itself, and under the Zulus close settlement in the form of a belt round high ground, denying access to game, also protected the high ground. As settlement is bound to be the eventual policy, it cannot be said that the ultimate future of the Mozambique Company's infested areas is seriously compromised by the presence in them of these flies.

BARRAUD (P. J.). **Mosquitos collected in Palestine and Adjacent Territories.**—*Bull. Ent. Res., London,* xi, pt. 4, March 1921, pp. 387–395.

The topography of the various regions in relation to mosquito incidence in Palestine is discussed. From November to April there is heavy rainfall over the larger part of the country, with much less rain in the deserts of the south. In summer the whole country becomes arid, and the inhabitants of towns and villages depend upon wells or rain-water collected in catchment tanks. In some localities there are perennial streams that sometimes form extensive marshy tracts where mosquitos breed during the greater part of the year. The major portion of Palestine, especially the central and northern regions, Syria and Cilicia are malarious; a fairly high percentage of the native population is infected, and Anophelines abound. The malaria season practically corresponds with the dry period, that is, from May to November. In early summer the Bedouins, with their flocks, descend to the plains for pasture and water; it has been thought that they may have been disseminators of the disease, but definite investigations have not been made in this respect; it may be that the presence of their many domestic animals protects them; the conditions under which these are stabled would seem to be favourable for the feeding and sheltering of Anophelines.

One of the most abundant domestic mosquitos of the country is *A. bifurcatus*, which occurs very numerously in the rain-water cisterns found beneath and around most private houses. In Jerusalem there are more than 4,000 of these basement cisterns, besides ancient drains and sewers, from which it is impossible to exclude mosquitos; large surface wells protected by masonry also form breeding-places. The abolition of these, and the provision of an adequate piped water supply to all the towns, is an urgent and important problem.

In Egypt, where the incidence of malaria is much less, the three chief malaria carriers of Palestine, *A. maculipennis*, *A. bifurcatus* and *A. superpictus*, are practically unknown. *A. multicolor* is there considered to be the principal carrier. It is abundant in the Canal zone and in the oases, where malaria is most prevalent, and where the population is largely a nomadic one, tending to spread the disease from place to place. All the species of Anophelines as yet found in Egypt occur also in Palestine, in spite of the wide strip of waterless desert separating the two countries. There are, however, four or five species in Palestine that are absent from Egypt.

The larvae of *A. maculipennis*, Mg., var., are usually found in natural waters, both fresh and brackish. The adults are found in large numbers in tents and huts in camps, and frequently cause a heavy incidence of malaria. They sometimes travel a considerable distance from their breeding-grounds. Breeding commences in April and May in the marshy coastal belt of Palestine; in the Jordan valley, at points below sea-level, it probably begins earlier. Larvae of *A. multicolor*, *A. hyrcanus*, *A. mauritianus*, *Culex univittatus* and *C. tipuliformis* were found at the same time. *A. bifurcatus* breeds almost exclusively in rain-water cisterns and covered surface wells. In Syria larvae and pupae were taken from a small, very shaded stream ; it appears to be essentially a cool-water species. *A. algeriensis*, Theo., is perhaps the species referred to by previous workers in Palestine as *A. fragilis*, Theo., or *A. aitkeni*, James. It does not seem to be very general, and breeds chiefly in large marshes away from human habitations, and therefore is probably not a frequent malaria-carrier. *A. hyrcanus*, Pall., also breeds in extensive marshes, and is found along the coastal belt of Palestine, and sometimes inland, but not, as yet, in Egypt. Adults occur nearly all the year round, but more abundantly in winter and spring. *A. mauritianus*, Grp., has practically the same distribution and is commonest early in the year. *A. superpictus*, Grassi, occurs in the larval stage in natural water, clear pools near fresh springs, etc. The adults are among the chief malaria-carriers in country districts. *A. culicifacies*, Giles, var. *sergenti*, Theo., occurs sparsely in pools ; *A. multicolor*, Camb. (*chaudoyei*, Theo.), the chief malaria-carrier in Egypt, previously known in Palestine as *A. turkhudi*, List., breeds in brackish marshes along the coast in late autumn, spring and early summer ; *A. pharoensis*, Theo., abundant in some parts of Egypt, and regarded as a doubtful carrier of malaria, is rare in Palestine ; *Stegomyia fasciata*, F., a domestic species, occurs in Palestine, Egypt and Syria, adults being abundant in the hot season ; *Ochlerotatus caspius*, Pall., is abundant in Egypt, but less so in Palestine, the larvae preferring brackish water ; *O. mariae*, Serg., is a sea-water species, abundant in salt pools along the coast, and troublesome owing to the adults biting in the daytime ; *O. detritus*, Hal. (*salinus*, Fic.) is abundant and troublesome during the wet season and early spring, the larvae occurring chiefly in brackish water near the coast. *Culex pipiens*, L., is ubiquitous and abundant near human dwellings ; the larvae differ somewhat from examples from Western Europe and Mesopotamia. *C. laticinctus*, Edw., is commonly found in tents in camps, the larvae occurring in surface wells, tanks, etc. ; *C. univittatus*, Theo., does not occur in great abundance, the larvae being found in marshes and stream pools, generally away from dwellings ; *C. tipuliformis*, Theo., and *C. hortensis*, Fic., are frequently present in the same habitat ; *C. mimeticus*, Noé, has been found with *A. superpictus*, but seems to be absent from Egypt. *Theobaldia longiareolata*, Macq., is abundant in all localities in water-barrels and other receptacles in gardens, surface wells, tanks and cisterns ; *T. annulata*, Schr., is less common and is not found in Egypt ; *T. morsitans*, Theo., was found in the larval stage in a quarry pool. *Uranotaenia unguiculata*, Edw., breeding in large swamps, is widely distributed in Egypt and is also found in parts of Palestine.

LAING (F.). **The Cockroach. Its Life-history and how to deal with it.**—*Brit. Mus.* (*Nat. Hist.*), *London*, Econ. Ser., no. 12, 1921, 18 pp., 1 plate, 2 figs. Price 6*d*.

The species of cockroaches commonly found in Britain are *Blatta orientalis*, L. (common or oriental cockroach) and *Blattella germanica*, L. (German cockroach) ; *Periplaneta americana*, L. (American cockroach) and *P. australasiae*, F. (Australian cockroach) are less frequently seen. The life-history and habits of these insects, and their depredations in houses, bakeries, etc., are described. Though cockroaches have not been definitely proved to convey disease to man, it is quite possible that they may do so ; they contaminate food and render it unfit for consumption, and sometimes do actual damage. All places that might provide an entrance for them, such as brick and tile work around fireplaces, entrance holes of pipes, etc., should be cemented up. This should be followed by the use of an insect powder, such as three parts of sodium fluoride to one part of pyrethrum powder, which should be scattered about at night and swept up and burnt with the dead insects next morning ; powdered borax and some sweet substance, or a mixture of one part plaster of Paris and two parts sugar may be substituted. Phosphorus paste is efficacious, but is dangerous to animals ; it is used by spreading on cardboard and placing in the runways of cockroaches. Traps, of which several are described, are useful in places where powder cannot be spread. Stale beer and peeled bananas have proved the best baits, and may be placed in a jam jar covered with a cardboard lid pierced with a wide hole through which a funnel-shaped paper cone is inserted. Fumigation with 2 lb. sulphur per 1,000 cu. ft., or carbon bisulphide in the same proportion, is efficacious, the room being closed for at least an hour with the former treatment and for 36 hours with the latter. In places that can be conveniently so treated, a temperature of 130° F. may be used to kill the cockroaches, sufficient time being allowed for the heat to penetrate to their hiding-places.

SÉGUY (E.). **Note sur l'Armure génitale du** *Culex jugorum*, **Villen.**—*Bull. Soc. Entom. France, Paris*, 1921, no. 3, 9th February 1921, pp. 39–40, 1 fig.

The characters of the male genital armature of *Culex jugorum*, Vill., are described and illustrated. These distinguish the males of this mosquito from those of any other species of the group of *Aëdes communis*, in which *C. jugorum* should be placed, next to *A.* (*Ochlerotatus*) *stictus*, Mg.

BEAL (W. P. B.). **Report on Live Stock Industries of the Northern Territories, Gold Coast.**—MS. Report, dated 27th May 1920, 97 pp. + 7 appendices, comprising 4 maps. (Abstract in *Trop. Vet. Bull., London*, ix, no. 1, 28th February 1921, pp. 36–50.)

This is a report on the present-day conditions of rearing live-stock in the Northern Territories of the Gold Coast ; measures by which the future of this industry might be improved are suggested.

It has been maintained [*R. A.E.*, B, vi, 97] that a thorough search would reveal tsetse-flies everywhere, but the author considers that there are areas in the Territories free from them, varying from 1 to 10 sq. miles in extent. *Glossina morsitans* is fairly common, and is an inland fly not seen in pure savannah districts, but occurring in the so-called savannah forest districts. *G. tachinoides* is very common, but is confined to the river system. During the rains it may be found alongside rivers with grassy banks, but is chiefly confined to rivers with banks covered with shrubs and small scrub. *G. palpalis* is comparatively rare, and is chiefly found on river banks covered with a dense undergrowth. Among the indigenous live-stock, outbreaks of trypanosomiasis with heavy mortality do not occur, but this is not the case among horses, especially imported animals. No appreciable harm seems to be caused to native stock in the fly areas, so that it would appear to have acquired a high degree of resistance.

The three types of trypanosomes in the Northern Territories are *Trypanosoma brucei* (*pecaudi*), *T. vivax* (*cazalboui*) and *T. congolense*. In horses the symptoms are nearly alike for all three, but infection due to *T. vivax* is not so severe as that caused by *T. brucei*, and most of the recoveries that do take place occur after *T. vivax* infection. In cattle *T. vivax* does not appear to do much harm, and no symptoms were observed. *T. brucei* is said to cause a sudden emaciation that lasts for a year, after which the health of the animal improves. *T. congolense* hitherto has only been found naturally in horses, but experimentally it is very fatal to sheep, goats and dogs.

Stomoxys spp. are met with wherever there is live-stock, the most common being *S. calcitrans*, which is confined to the villages, and, as a rule, does not follow cattle out to grass. In 1912 the author attributed the spread of trypanosomiasis among horses at Accra to *Stomoxys* and *Lyperosia* found in the district [*R.A.E.*, B, ii, 48]. Given a reservoir of infection, *Stomoxys* seems capable of maintaining an enzootic centre in an area. These flies also act as carriers of two worms, *Habronema microstoma* and *H. macrostoma*, found in the stomachs of horses and donkeys.

The common Hippoboscid is *Hippobosca maculata*, which is said to be capable of transmitting trypanosomiasis mechanically, like *Stomoxys*.

Many species of Tabanids occur and cause annoyance to cattle. They are also believed to maintain an enzootic centre of trypanosomiasis by mechanical transmission.

The following ticks occur in the Territories :—*Amblyomma splendidum*, fairly rare, found on cattle ; not known to transmit disease. *A. variegatum*, common, found on cattle and sheep, to which, however, it does not appear to transmit any specific disease. *Margaropus* (*Boophilus*) *annulatus australis*, common, found on cattle, transmits redwater. *B. annulatus decoloratus*, very common, found on cattle, sheep and goats, conveys redwater and also, it is said, spirochaetosis in cattle. *Haemaphysalis leachi*, found on carnivora, especially dogs, rarely on cattle, sheep, goats and horses ; transmits canine piroplasmosis. *Hyalomma aegypticum*, common, found on all domesticated animals, transmits bovine redwater. *Rhipicephalus sanguineus*, common, found on dogs, sheep and goats ; transmits canine piroplasmosis. *R. simus*, common, found on cattle, and being a transmitter of African Coast fever, would become a serious factor should this disease be introduced.

The only method at present adopted for ridding the country of ticks is to burn the pastures at a certain time of the year, but this is unsatisfactory. Stunting of growth, decreased milk yield, and marked depreciation of the hides are the results of tick infestation.

The commonest forms of piroplasmosis of cattle in the Northern Territories are those due to *Piroplasma bigeminum*, *Theileria mutans*, and a third parasite, *Achromaticus* [*macfiei*] [*R.A.E.*, B, viii, 62]. These parasites set up only benign affections, inasmuch as all calves become infected shortly after birth.

The horse is also said to be subject to infection with *Nuttallia equi*, producing a dangerous and frequently fatal anaemia. Up to the present time piroplasmosis has not been detected in sheep.

Patton (W. S.). **Some Notes on the Arthropods of Medical and Veterinary Importance in Mesopotamia, and on their Relation to Disease. Part III. The Bot Flies of Mesopotamia.**—*Ind. Jl. Med. Res., Calcutta*, viii, no. 1, July 1920, pp. 1–16, 2 plates, 2 figs. [Received 11th April 1921.]

It is now considered established that *Musca humilis*, Wied. [*R. A.E.*, B, ix, 15] is one of the most important house-flies in the East; it is identical with *M. enteniata*, Big., and probably with *M. conducens*, Wlk., and *M. praecox*, Wlk. The genus requires revision, and the author asks for specimens of *Musca* from any part of the world for this purpose.

Gastrophilus intestinalis var. *bengalensis*, Macq., the adults of which are seen in Mesopotamia in March and April and August and September, lay their eggs preferably on the hairs on the inner sides of the forelegs. The larval stage is passed in the horse from about the end of October or beginning of November until March, and again from April till about the middle of August. The works of various authors on the method by which the larvae reach the stomach and duodenum of horses and mules are reviewed.

The eggs of *G. nasalis*, L., are laid singly on the hairs between the rami of the jaws, close to the skin. The writer's observations confirm those of Cameron [*R. A.E.*, B, vii, 58] that *G. nasalis* never oviposits on the skin of the lips, though in exceptional cases eggs may be found on the hairs on the under-surface of the lower lip. The adults are seen at the same time as *G. intestinalis* var. *bengalensis*, but are less numerous. Owing to the irritation, worry, loss of flesh and mechanical injury due to rubbing or falls as a result of cumulative effects of a number of these flies, horses and mules should be protected from them, especially from *G. nasalis*. For this purpose the method suggested by Hadwen and Cameron is advocated [*loc. cit.*, vii, 56]. Special attention should be paid to the clipping of egg-laden hairs and the destruction of larvae dropped in the excreta. As a rule well-nourished animals do not suffer much from the presence of large numbers of larvae. It has been definitely proved that *Gastrophilus* larvae do not cause pernicious anaemia of horses; no case of the disease has been recorded from Mesopotamia.

Cephalopsis titillator, Clark (*Cephalomyia maculata*, Wied.) is very common in Mesopotamia; it attacks dromedaries, and is probably a variety of the species attacking camels. It is not oviparous, as is generally supposed. The larvae are deposited one or more at a time inside the nasal orifice. They crawl up the nostrils to the nasopharynx, where they remain until mature. There are two broods in the year. The larvae of the early brood begin to leave the nasal cavity about the middle of March. Larvae collected on 22nd March pupated on 23rd to 27th, and adults began emerging about 10th April. Larvae were deposited in the middle of April, and began leaving the nasal cavity about the middle of August. The adults appeared again early in September and deposited larvae in the same month.

Oestrus ovis, L. (sheep bot) is larviparous in India and Mesopotamia, the larvae being deposited just inside the nose. It has apparently two broods in Mesopotamia, which correspond to those of *Cephalopsis titillator*, though development is probably much more rapid in hot weather.

As far as could be ascertained, the larvae of *C. titillator* in no way interfere with the health of the animals, but a great deal of inflammatory changes occur in the nasopharynx, especially if the larvae are abundant. It should be easy to devise some mechanical contrivance to prevent larviposition. *Oestrus ovis* produces the condition in sheep known as staggers. The author knows of no means of controlling this pest.

PATTON (W. S.). **Some Notes on Indian Calliphorinae. Part I.** *Chrysomyia bezziana*, **Villeneuve, the common Indian Calliphorine whose Larvae cause Cutaneous Myiasis in Man and Animals.**—*Ind. Jl. Med. Res., Calcutta*, viii, no. 1, July 1920, pp. 17–29, 1 plate. [Received 11th April 1921.]

The various stages of *Chrysomyia bezziana*, Vill., are described. This is the common species causing myiasis of man and animals in India. The eggs are laid either directly on the diseased tissue or in its immediate vicinity, such as soiled dressings, etc. The larvae collected hatched in about 28 hours. There can be very little doubt that this fly never oviposits in the bodies of dead animals. Attempts to raise first and second stage larvae on decomposing matter failed, and only a few were raised on recently killed rabbits. Several cases of attack by this fly in man and animals are described. [*cf R.A.E.* B, ix, 53.]

PATTON (W. S.). **Note on the Occurrence of** *Passeromyia heterochaeta*, **Villeneuve, in India.**—*Ind. Jl. Med. Res., Calcutta*, viii, no. 1, July 1920, pp. 30–31, 1 plate. [Received 11th April 1921.]

Passeromyia heterochaeta has been taken from nests of house sparrows in India. As soon as a bird dies, it is attacked by the larvae, which suck out the body fluids and even penetrate the abdomen.

Phormia azurea is recorded from birds' nests, especially those of thrushes and chaffinches, in Great Britain.

CRAGG (F. W.). **Further Observations on the Reproductive System of** *Cimex*, **with special reference to the Behaviour of the Spermatozoa.**—*Ind. Jl. Med. Res., Calcutta*, viii, no. 1, July 1920, pp. 32–79, 8 plates, 4 figs. [Received 11th April, 1921.]

The contents of this paper are sufficiently indicated by its title.

AWATI (P. R.). **Bionomics of House-flies. IV. Some Notes on the Life-history of** *Musca*.—*Ind. Jl. Med. Res., Calcutta*, viii, no. 1, July 1920, pp. 80–88, 7 tables. [Received 11th April 1921.]

Musca divaricata and *M. promisca* were used for the experiments described. Both species were found to oviposit throughout adult life, and the flies usually died within a week after laying the last batch of eggs. The first eggs are laid from 9 to 18 days after emergence. The interval between the batches was generally short, but in some cases lasted from 6 to 10 days. *M. divaricata* never laid less than 50 eggs, while *M. promisca* never laid more. The latter species generally chose fresh human faeces for oviposition, though it would also lay eggs on fresh goat dung if the former was not available, but *M. divaricata* invariably oviposited on goat dung. The average life of the individual was 16 days, the total life-cycle from egg to egg occupying about a month.

FRIEDERICHS (K.). **Zur Kriebelmückenfrage.** [The *Simulium* Problem.]—*Deutsche Tierärztl. Wochenschr., Hanover,* xxix, no. 14, 2nd April 1921, pp. 171–173.

The names given in a key in a previous paper [*R. A.E.*, B, ix, 36] require revision as follows :—*S. reptans* becomes *S. ornatum nitidifrons*, Edw. ; *S. pictum*, *S. reptans* ; and *S. venefica*, sp. n., *S. variegatum*, Meig.

Up to the present the regulation of pasturing at the danger periods is the only practical means for preventing losses, and if the rules are observed it suffices.

There appears to be no reason for disputing Wilhelmi's theory that climate is a factor in the occurrence of outbreaks [*R.A.E.*, B, viii, 217], but this requires supplementing by information regarding the species of *Simulium* concerned. Specific determinations have been made only in a very few cases. *S. reptans* and *S. argyreatum* are undoubtedly dangerous. *S. maculatum* (which name the author retains on grounds of convenience in preference to *S. equinum*, L., given by Edwards) chiefly attacks horses' ears, but fatal cases do not appear to have been recorded. From Thuringia a species described by the author as *S. nölleri* has been bred from pupae, but there is as yet no definite record of this species biting cattle in that region. It is absolutely necessary to ascertain what species, if any, other than *S. reptans* and *S. argyreatum*, cause mortality.

At present 14 species of *Simulium* are known from Germany, but others undoubtedly occur there.

ENDERLEIN (G.). **Das System der Kriebelmücken (Simuliidae).** [The Classification of Simuliids.]—*Deutsche Tierärztl. Wochenschr., Hanover,* xxix, no. 16, 16th April 1921, pp. 197–200.

In the present short preliminary paper the author, who appeals for specimens accompanied by full data, gives the results of his own observations and research.

Friedrichs has stated that these flies do not molest man, but the author himself and other persons have been attacked, *Simulium* (*Boophthora*) *sericatum*, Mg., being a species identified in some cases. Specimens received seem to show that this species is responsible for the marked losses among cattle around Hanover.

Swarming of the males, as in Chironomids, does not appear to have been observed in Simuliids until the author noticed a swarm of males of *Wilhelmia nigra*, Mg., mixed with *W. nigra* var. *aurescens*, End., in 1919 in Saxony.

Pupae collected after a spell of severe cold weather (— 10° C. = 14° F.) yielded adults in an apparently normal manner.

Parasites of Simuliids are almost unknown, but the author once obtained the Braconids, *Ademon decrescens*, Nees, and *Grypocampa affinis*, Nees, from pupae of *Simulium* (*Nevermannia*) *aureum*, Fries.

A key to the subfamilies is given, stress being laid on the necessity for using it for every specimen, owing to the great resemblance between species of quite different groups. This key is followed by a list showing the various species belonging to each genus ; there are 44 species, divided among 15 genera, including 12 new ones erected by the author, those mentioned above being amongst these.

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Awati (P. R.). **A Note on the Genitalia of Portchinsky's Species, *M. corvina* (vivipara) and *M. corvina* (ovipara).**—*Ind. Jl. Med. Res., Calcutta*, viii, no. 1, July 1920, pp. 89–92, 1 plate, 2 tables. [Received 11th April 1921.]

As a result of the examination of the genitalia of Portchinsky's species of *M. corvina*, it appears that the viviparous and oviparous forms cannot be seasonal varieties of the same species, but are two distinct ones, and should be referred back to their respective names *M. corvina*, F. (viviparous) and *M. autumnalis*, DeG. (oviparous).

Wright (R. E.). **A Case of Myiasis of the Frontal and Ethmoidal Sinuses and the Orbit.**—*Ind. Med. Gaz., Calcutta*, lvi, no. 2, February 1921, pp. 58–59, 1 fig.

In the case of myiasis described, an entomological note by W. S. Patton states that larvae of *Chrysomyia bezziana* were collected from the lesion. The eggs were laid directly on the ulcerated surface, and though the larvae were very near the brain tissue, they did not enter the skull. This emphasises the fact that the larvae of this fly do not penetrate bone or cartilage.

Nicholls (H. M.). **Annual Report of the Government Microbiologist.**—*Tasmania Dept. Agric. & Stock, Rept. 1919–20, Hobart*, 1920, pp. 21–25. [Received 12th April 1921.]

Sheep bot-flies [*Oestrus ovis*] are extensively distributed over Tasmania, but apparently are not of any great economic importance under present conditions.

A plague of fleas was recorded during the year, the species concerned being *Ctenocephalus canis* (dog flea). The outbreak was apparently the result of using soil from an old pigsty to improve a garden. Other fleas recorded are *Stephanocircus dasyuri* from a bandicoot, and a bat flea, *Ceratopsylla* sp.

Riley (W. A.). **Division of Entomology and Economic Zoology.**—*28th Ann. Rept. 1919–20, Minnesota Agric. Expt. Sta., Univ. Farm, St. Paul*, 1920, pp. 41–44. [Received 13th April 1921.]

Attention is called to the presence of flies of the genus *Drosophila* in dissecting rooms and to the possibility of their being disease-carriers. Their ability to breed in materials preserved in formalin solutions and in various other reagents is being studied. Studies on the rôle of rodents as carriers of parasites of man have been continued, as well as work on fish parasites.

Sealy (S. T.). **Mosquito Work, Season of 1920.**—*Conn. Agric. Expt. Sta., New Haven*, Bull. 226, 1921, pp. 208–210.

During 1920 the drained salt-marshes were constantly patrolled, the water kept in circulation, and the necessary supplementary draining done. The mosquitos that have been the most troublesome have come, not from the drained marshes, but from adjoining ones where no ditches have been installed. As soon as any surface breeding was noted on a drained area, it was immediately drained to the nearest ditch. A detailed account is given of the work done in various localities. In one district the settling tanks used to catch the waste water from paper mills were found to be the breeding-place of numbers of *Culex pipiens*, and as these tanks frequently overflowed into a neighbouring brook, the mosquitos became distributed in this manner. A method of eliminating this is being worked out.

Senior-White (R. A.). **New Ceylon Diptera.**—*Spolia Zeylanica, Colombo*, xi, no. 43–44, 7th March 1921, pp. 381–395, 2 plates.

The Tabanid, *Haematopota rhizophorae*, sp. n., is described from Ceylon.

Friedrichs (K.). **Zur Kriebelmückenfrage.** [The *Simulium* Problem.] —*Deutsche Tierärztl. Wochenschr., Hanover*, xxix, no. 17, 23rd April 1921, pp. 212–213.

This is a supplement to the author's recent paper under the same title [*R.A.E.*, B, ix, 104], and discusses some criticisms recently made by Wilhelmi. The author rather doubts the desirability of the many genera proposed by Enderlein [*loc. cit.*].

Kieffer (J. J.). **Chironomides d'Afrique et d'Asie conservés au Museum National Hongrois de Budapest.** [African and Asiatic Chironomid in the Collections of the Hungarian National Museum at Budapest.]—*Ann. Mus. Nat. Hist. Hung., Budapest*, xvi, pt. 1, 30th August 1918, pp. 31–136, 48 figs. [Received 11th April 1921.]

Tables are given for the determination of the described species, nearly all of which are new. The new species include two Asiatic species of the genus *Culicoides*, *C. albonotatus* and *C. nadayanus*, and ten African ones, *C. griseidorsum*, *C. impressus*, *C. circumscriptus*, *C. silvestrii*, *C. lugens*, *C. albosparsus*, *C. conjunctus*, *C. xanthogaster*, *C. remotus*, and *C. guineensis*.

Laveran (A.) & Franchini (G.). **Contribution à l'Etude des Insectes propagateurs de la Flagellose des Euphorbes.** [A Contribution to the Study of the Insects that transmit the Flagellates of *Euphorbia*.]—*Bull. Soc. Path. Exot., Paris*, xiv, no. 3, 9th March 1921, pp. 148–151.

In view of the frequent occurrence of flagellates of the genus *Herpetomonas* in insects, it seems logical to suppose that those species that suck the latex of *Euphorbia* should play an important rôle in the occurrence of flagellates in that plant. This question has been studied since 1910, and the knowledge regarding the relations between certain insects and the disease in *Euphorbia* is briefly reviewed. In 1920 it was established that a bug, *Stenocephalus agilis*, is not only a transmitter of the disease from one plant to another in Portugal, but is also the primary animal host of the flagellate of *Euphorbia* [*R.A.E.*, B, viii, 216]. It would be interesting to know if *S. agilis* is found on infected *Euphorbia* in Italy; it has not as yet been traced among many insects taken on the plant. Among insects collected on *Euphorbia* at Bologna, those capable of sucking the latex include the Lygaeids, *Nysius* sp. and *Lygaeus* sp., the Pentatomid, *Calocoris chenpodii* and the Capsid, *Megaloceraea ruficornis*. *Nysius* sp. has previously been found on *Euphorbia* infected with flagellosis in Mauritius and in the Indies, and seems to have been rightly regarded as a transmitting agent of the disease. It is possible that this insect may be, like *S. agilis*, the primary host of *Herpetomonas davidi* in certain regions and may serve for its development. The absence of *S. agilis* among the insects collected at Bologna indicates that there is some other species capable of playing the same rôle as that observed for the former insect in Portugal. The four species cited above should be examined for possible infection of the salivary glands.

PRINGAULT (E.). **Capture dans les Bouches-du-Rhône de** *Theobaldia spathipalpis* **(Rondani).**—*Bull. Soc. Path. Exot., Paris*, xiv, no. 3, 9th March 1921, pp. 163–164.

During 1920 numerous breeding-places of *Theobaldia longiareolata* (*spathipalpis*) were found near Marseilles, this fairly widespread mosquito being considered rare in France. Two individuals captured at Gibraltar were found to be carriers of organisms morphologically identical with *Micrococcus melitensis* and with Eberth's bacillus; this discovery, however, has not been subsequently confirmed. This mosquito occurs in the district of Bouches-du-Rhône in almost all ponds, overgrown ditches, drinking-troughs, etc.

In the laboratory the egg-stage, at a medium temperature for the region, occupied 3 to 4 days, the larval stage 15 to 20 days, and the pupal period 2 or 3 days. From all the pools examined, if a species of *Theobaldia* occurred, either *T. annulata*, Schr., or *T. longiareolata*, *Macq.*, were found, but never both species from the same pool, though their preferred habitats are identical.

SÉGUY (E.). **Note sur la Détermination de nos Culicides indigènes.**—*Bull. Soc. Path. Exot., Paris*, xiv, no. 3, 9th March 1921, pp. 179–187.

Keys are given to facilitate the identification of the mosquitos known to occur in France.

SALM (A. J.). **Enkele nieuwe bloedzuigende Insekten.** [Some new Blood-sucking Insects.]—*Geneesk. Tijdschr. Ned.-Indië, Batavia*, lxi, no. 1, 1921, pp. 58–64, 2 plates.

Descriptions are given of the following new species:—*Ceratopogon raphaelis*, *Culicoides esmoneti*, and *C. javanicus*, all from Java.

OTTEN (L.). **Dienst der Pestbestrijding. Verslag over het Jaar 1919.** [Anti-Plague Service. Report for 1919.]—*Bijblad Geneesk. Tijdschr. Ned.-Indië, Batavia*, lx, no. 3, 1920, 135 + xii pp., map and charts. [Received 13th April 1921.]

Observations have confirmed the view that *Mus concolor* is originally an outdoor rat, occupying a secondary position as a house rat in comparison with *Mus rattus griseiventer*, the true house rat.

Appendices to this report contain information on methods of construction and materials the use of which is desirable in securing rat-free dwellings.

SERGENT (Ed.). **Etude morphologique du** *Piroplasma* (*Gonderia*) *mutans* **du Boeuf.**—*Ann. Inst. Pasteur, Paris*, xxxv, no. 3, March 1921, pp. 193–203, 1 plate.

A study of *Piroplasma* (*Gonderia*) *mutans*, made from 1,369 specimens from Algerian cattle, showed that it occurs in two principal forms, varying in their numerical proportion. One is annular, with a large vacuole, and the other is bacilliform. In the cases observed the infestation was slight, an average of 5·9 per mille red corpuscles being infected. The infection is compatible with excellent health.

FOLEY (H.). **Microfilaires du chien dans le Sud-Oranais.**—*Ann. Inst. Pasteur, Paris*, xxxv, no. 3, March 1921, pp. 212–217, 1 plate.

Dogs in the South Oran district of Algeria harbour two microfilaria, *Microfilaria immitis* and another described here as *M. auquieri*, sp. n.

BASSETT-SMITH (P. W.). **Trypanosomiasis.**—*Jl. Trop. Med. & Hyg., London*, xxiv, no. 8, 15th April 1921, pp. 105–108.

The history of trypanosomiasis in man, mainly in Africa, is reviewed. The question of immunity, especially among West African natives, is discussed, and an account is given of the extermination of *Glossina palpalis* on the Island of Principe [*R. A.E.*, B, iv, 48].

FISHER (H. C.). **Report of the Health Department of the Panama Canal for the Calendar Year 1919.**—*Mount Hope, C. Z.*, 1920, 134 pp., 20 plates. [Received 21st April 1921.]

Climatic conditions were probably the cause of the variation in malarial incidence during the year in the Canal Zone, where the cases were more numerous during 1919 than they had been since 1915. Undrained swamps in the neighbourhood of Colon, Cristobal and Gatun gave rise to unusual swarms of *Anopheles albimanus* and *A. tarsimaculatus*. A larvicide spray was used repeatedly as the easiest way of destroying the mosquitos covering the screens. The nearest breeding-ground was found to be nearly two miles away by direct flight, with about a mile of open water intervening. Considerable work has been already done in connection with the draining of swamps, and the plans for future action are discussed.

In connection with the quarantine division of the Canal Zone, provision is made for catching mosquitos on ships arriving from yellow fever zones. Captures included *Stegomyia fasciata* (*Aëdes calopus*) from Colombia, and *Anopheles albimanus* and *Culex fatigans* (*quinquefasciatus*) from Nicaragua. A continuation of intensive anti-mosquito work, accompanied by regular monthly *Stegomyia* surveys as an index of results, and a constant supervision of neighbouring ports, would decrease the present danger and do much to eliminate the present costly and annoying delays. During 1919, 80 vessels were delayed in quarantine 173 days, and 15,839 passengers were detained for 16,328 days.

The mosquitos sent for identification included :—*Anopheles punctimacula, A. albimanus, A. tarsimaculatus, A. argyrotarsis, A. pseudopunctipennis, A. apicimacula, A. taeniorhynchus*, three species of *Haemagogus, Lutzia allostigma, Deinocerites melanophyllum, D. pseudes, Taeniorhynchus* (*Mansonia*) *titillans, T.* (*M.*) *nigricans, T.* (*M.*) *fasciolatus, Aëdomyia squamipennis, Orthopodomyia fascipes, Psorophora posticata, Uranotaenia geometrica, U. lowi* and *U. typhlosomata*.

Para-dichlorobenzene or camphor are advocated for preventing the breeding of the yellow fever mosquito (*Stegomyia fasciata*) [*R. A.E.*, B, viii, 32.]

Unremitting diligence is exercised to keep the Canal Zone as free from flies as possible. Their breeding may be prevented by removing manure from the pits as required after 15 days' composting and mixing it thoroughly with an equal quantity of fresh earth and using it at once as a top dressing, three inches thick. Borax has also been used with success. A system for killing larvae in all stables in Panama every three weeks has been instituted, and a fine is imposed on anyone on whose premises flies are found breeding.

TROOP (J.). **Entomology.**—*33rd Ann. Rept., 1919–20, Purdue Univ. Agric. Expt. Sta., Lafayette, Ind.*, 1920, pp. 22–23, 2 figs.

The mite, *Liponyssus silvarum*, is recorded as infesting poultry. Various dips, as well as dusting with sulphur, proved successful against this pest. For the treatment of a whole flock fumigation with nitrobenzol is advocated. This method does not injure the birds, but it must not be applied to laying hens, as the inhaled fumes apparently render the unlaid eggs unfit for domestic purposes.

MASON (F. E.). **Colocynth Tar (Ar. *Zeit el Handal*), its medicinal Uses, with particular reference to the Cure of Scabies.**—*Agric. Jl. Egypt, Cairo*, x, 1920, pp. 48–53, 2 plates.

Colocynth tar, obtained by heating the seeds of the colocynth gourd (*Citrullus colocynthis*), has been found to be an effective remedy against mange in camels produced by *Sarcoptes scabiei cameli*. One application proved sufficient to cure psoroptic mange in equines, in which it will also cure sarcoptic mange. It is also efficient against ticks. The methods of preparation and application are described.

RICHARDSON (U. F.). **Annual Report of the Chief Veterinary Officer.**—*Uganda Dept. Agric. Ann. Rept. 1919–20, Entebbe,* 1921, pp. 35–39.

Stomoxys spp. were extremely numerous during May and June 1919, and a large number of cattle died as a result of worry from these flies. Trypanosomiasis has been encountered in almost every district in which work has been carried on, and some herds of transport cattle were almost completely wiped out. They have been replaced, and since dipping was begun in July, no further cases have been recorded.

MOHLER (J. R.). **Report of the Chief of the Bureau of Animal Industry** [1919–20].—*U.S. Dept. Agric., Washington, D.C.*, 1920, 69 pp. [Received 27th April 1921.]

During the year ended 30th June 1920 the Field Inspection Division supervised 9,515,720 dippings for the purpose of eradicating scabies in sheep, and 1,657,418 dippings for scabies in cattle. Against the cattle tick (*Boophilus annulatus*) 35,045 dipping vats were in operation and 44,813,070 inspections or dippings were made, as compared with the previous year [*R. A.E.*, B, viii, 98]. Areas aggregating 50,555 sq. miles have been freed from ticks and released from quarantine during the year. So far, 70 per cent. of the original infested area has been released since 1906. The remedial measures advocated for the control of pig lice and pig mange have already been noticed [*loc. cit.* 200]. Repeated applications of lime-sulphur dip or crude petroleum proved effective for the eradication of light cases of sarcoptic mange in horses. Of various remedies tried against screw-worms (*Cochliomyia macellaria*), gasoline has proved the best, but is not entirely satisfactory.

The laboratory work on dips and disinfectants has followed the same general lines as in previous years.

Abbott (W. S.). **Results of Experiments with Miscellaneous Substances against Chicken Lice and the Dog Flea.**—*U.S. Dept. Agric., Washington, D.C.*, Bull. 888, 13th October 1920, 15 pp., 7 tables. [Received 27th April 1921.]

As the result of experiments with various substances for the destruction of lice in fowls, oil mixtures were found to be effective when lightly sprayed on the birds, but dipping in the same substance or rubbing it into the feathers proved fatal. As a spray for the roosts and interiors of chicken-houses they proved useless. Oil emulsions were not effective at a greater dilution than 1 to 100. Fumigation with oils, by placing the bird in a sprayed or painted box for at least 30 minutes, although effective against the lice, is not advocated owing to the injury caused to the fowls. Mercurial ointment was effective when applied around or just below the vent of the fowl, but vaseline and paraffin were useless applied in the same way. The information in connection with naphthaline has already been noticed [*R.A.E.*, B, viii, 13]. Powders containing nicotine, naphthaline and sulphur were effective when added to the dust bath. Nicotine powders cannot be relied upon at lower strengths than 1·15 or 1·25 per cent., and even then require very careful application. Pyrethrum powder killed all lice within 24 hours, and even when diluted to 5 per cent. it was effective if thoroughly applied, though powdered pyrethrum stems were of no value.

Against *Ctenocephalus canis*, Curt. (dog flea) pyrethrum powder alone, or when forming not less than 50 per cent. of the mixture, proved effective. Pure naphthaline was effective when well rubbed into the hair. The various lice powders are effective in proportion to the amount of active ingredients present and the fineness of the powder; thus 18 per cent. of sassafras oil was effective, but 10 per cent. and less was of no value; even 4·56 per cent. tobacco powder was not completely effective. Emulsified disinfectants were effective at the rate of 1 to 64 of water when used as sprays and as dips at 1 to 130. Several liquids were effective as fumigants.

Kinghorne (J. W.) & Green (D. M.). **Lice, Mites and Cleanliness.**—*U.S. Dept. Agric., Washington, D.C.*, Farmers' Bull. 1110, September 1920, 10 pp., 1 fig. [Received 27th April 1921.].

Much of the information on parasites of fowls contained in this popular bulletin has been previously noticed[*R.A.E.*, B, vi, 14].

Hall (M. C.). **Parasites and Parasitic Diseases of Sheep.**—*U.S. Dept. Agric., Washington, D.C.*, Farmers' Bull. 1150, December 1920, 53 pp., 34 figs. [Received 10th April 1921.]

This bulletin includes a brief description of the life-histories of and remedial measures for the following insect parasites of sheep:—the lice, *Haematopinus ovillus*, *Linognathus pedalis* and *Trichodectes ovis*; the Hippoboscid, *Melophagus ovinus*; the mite, *Psoroptes communis ovis*; the tick, *Ornithodoros megnini*; and the flies, *Cochliomyia macellaria*, *Phormia regina*, *Lucilia sericata* and *Oestrus ovis*.

Parker (R. R.). **The Control of Rocky Mountain Spotted Fever in the Bitter Root Valley.**—*Montana State Bd. Ent., Bozeman,* Circ. 1, March 1919, 23 pp. Revised March 1921, 20 pp.

The remedial measures for the tick [*Dermacentor venustus*] that disseminates Rocky Mountain spotted fever consist of dipping, rodent destruction, quarantine measures, hand-picking of ticks from cattle and horses, tick repellents on stock and the regulation of grazing on unfenced land. The newly-hatched ticks and nymphs feed only on rodents, their most important host being the ground squirrel, which is much more abundant and more widely distributed than any other rodent. Adult ticks, within the limits of control areas, feed almost entirely on horses, cattle and sheep, and are present in dangerous numbers only during the spring and early summer. If, therefore, all ground squirrels could be killed off, or the adults be kept from feeding on the larger domestic animals, the ticks would be practically eradicated. Residents in Bitter Root Valley are therefore advised to destroy every rodent possible. Ground squirrels may be trapped, shot, or poisoned, the last being the cheapest and most effective remedy. The formula recommended contains 8 U.S. quarts of crushed oats, 1 oz. strychnine alkaloid, 1 teaspoonful saccharine, $\frac{1}{2}$ lb. starch, 1 oz. sodium bicarbonate, and $\frac{1}{2}$ to $\frac{3}{4}$ quart of water. This, when mixed, should be placed on a bare spot at the side of, or just behind, the hole, using one teaspoonful at each spot. By a regulation of the State Board of Entomology, all landowners in tick-infested districts are required to spread the poison over their territory twice during each season, namely, during the first half of April and during the first 10 days of June, the poison being obtainable from the Board of Entomology Field Station at the cost of materials and preparation.

The methods by which adult ticks may be prevented from engorging on horses and cattle are the prohibition or control of grazing on infested territory, which results in the starvation of adult ticks, hand-picking, dipping, and the use of repellents. Clearing and burning are of some value as accessory measures. By keeping range animals from tick-infested territory from 1st March until the adult tick season is over, for a period of several successive years, practically 100 per cent. of the adult ticks will be killed by starvation. In places where grazing is the only remedial measure, five years would be the minimum time possible for eradication, a longer period giving decidedly more satisfactory results. Where both grazing and rodent destruction are practised (the latter being thoroughly undertaken early in the spring) a fair degree of control should be expected in three years. Indiscriminate grazing on unfenced foot-hill areas is a constant source of infestation, but experience has shown that this cannot be entirely prohibited without hardships in some cases. It is, however, being restricted to certain portions, and roadside grazing is prohibited. Owners of dairy stock, work horses, etc., are required to free them of ticks by hand-picking at least once each week and to destroy the ticks. General compulsory dipping has been stopped for various reasons, but the dipping vats are filled each spring and stock-owners are urged to use them. As repellents, raw linseed and raw cottonseed oils, particularly the latter, have proved the most successful, but the real value of this method can only be proved by further experience.

Quarantine regulations are in force in each district included in the tick control scheme from 1st March to 15th July of each year, during which time the entrance or exit of horses, cows, mules, sheep and goats is forbidden except under permit of the Secretary of the State Board.

The Regulations of the Montana State Board of Entomology for the eradication of ticks transmitting Rocky Mountain spotted fever are given verbatim.

DE STEFANI (T.). **Importanza dell' Entomologia applicata nell' Economia sociale.** [The Importance of Applied Entomology in Social Economy]—*Allevamenti, Palermo,* ii, no. 4, 10th April 1921, pp. 101–103.

This is the fourth part of a popular paper on applied entomology [*R.A.E.*, A, ix, 268], and deals with the part played by insects as disease carriers.

CRIMI (P.). **La Rogna sarcoptica degli Equini. Metodo curativo efficace, rapido e semplice.** [Sarcoptic Mange of Equines, and an effective, rapid and simple Method of Cure]—*Allevamenti, Palermo,* ii, no. 4, 10th April 1921, pp. 115–119.

The curative treatment described in this article has already been noticed from another source [*R.A.E.*, B, viii, 153].

BONDAR (G.). **Os Insectos damninhos. IX. As Pulgas.** [Injurious Insects. IX. Fleas.]—*Characas e Quintaes, S. Paulo,* xxiii, no. 3. 15th March 1921, pp. 189–190, 3 figs.

This is a popular article compiled from sources already noticed [*R.A.E.*, B, iv, 166].

URIARTE (L.). **Profilaxis de la Peste de Oriente. Las Ratas y los Depósitos de Mercaderías.** [Prophylaxis of Bubonic Plague. Rats and Food Depositories.]—*Anales Dept. Nac. Higiene, Bueno Aires,* xxvi, no. 5, September and October 1920, pp. 293–318, 24 figs. [Received 29th April 1921.]

Owing to the ravages of bubonic plague in Argentina and the impossibility of preventing its spread as long as rats are allowed to breed on the quays where food materials are deposited, a project has been formulated requiring that all buildings, flooring, or shelters where food material is deposited within the zone of the port of Buenos Aires must be rat-proof, and establishing certain conditions for the installation of depositories for cereals. The National Department of Hygiene has for a long time been aiming at improvement of the conditions of depositories at the ports, railway stations, and in agricultural districts. Many illustrations are given of hygienic and rat-proof buildings.

Tifus exantemático en la Provincia de Salta.—*Anales Dept. Nac. Higiene, Buenos Aires,* xxvi, no. 5, September and October 1920, pp. 339–347. [Received 29th April 1921.]

The Sanitary Commission in the Province of Salta has established beyond doubt that exanthematous typhus is endemic in the valleys of Calchaquí, where epidemics, particularly during extreme cold, decimate the population and constitute a menace to neighbouring regions. It is considered most probable that the disease has existed in the north-east of Argentina since time immemorial, and during epidemics the mortality is estimated at approximately 15 to 20 per cent. of the population. The Commission is carrying out an energetic prophylaxis, especially with regard to the extermination of lice.

COATES (W. H.). **The Sarcoptic Mange of the Dog in Man.**—*Brit. Med. Jl., London,* no. 3144, 2nd April 1921, p. 495.

Attention is drawn to a case of sarcoptic mange transmitted from dog to man.

DYAR (H. G.). **The Mosquitoes of Canada.**—*Trans. R. Canadian Inst., Toronto,* no. 29, xiii, pt. 1, February 1921, pp. 71–120.

This list of Canadian mosquitos includes a key to the tribes and genera as well as to the Canadian species of *Culex, Theobaldia* (*Culiseta*), *Aëdes, Heteronycha* (by the male genitalia) and *Anopheles.*

TORRANCE (F.). **Reports of the Veterinary Director-General.**—*Canada Dept. Agric., Ottawa,* 1917, 19 pp., 1918, 24 pp., 1919 and 1920, 49 pp. [Received 6th May 1921.]

Cattle mange in Canada is confined to certain parts of southern Alberta and south-western Saskatchewan. Affected areas have been under quarantine prohibiting the movement of cattle except for immediate slaughter at a designated abattoir, or unless they have been twice dipped under the supervision of an officer of the Department of Agriculture. By these means the extent of infection has been gradually lessened, and the quarantine restrictions have been removed from certain areas.

In 1920, a determined effort was made to stamp out the disease. The whole of the affected area was sub-divided into dipping districts, and each district was equipped with a staff selected by the farmers to supervise the construction of new dipping vats where necessary and the repairing of existing vats, and to maintain a general high standard of thoroughness in dipping. The Department granted about £80 towards the construction of new vats, and it is hoped that it will be possible to dip twice all the cattle in the mange area, and that subsequently the restrictions now in force may be abolished.

FERGUSON (E. W.). **A List of the Tabanidae (Diptera) in the South Australian Museum, with Descriptions of New Species.**—*Records S. Australian Mus., Adelaide,* 1, no. 4, 29th January 1921, pp. 366–379. [Received 9th May 1921.]

The new species described are: *Silvius imitator, S. tepperi, Tabanus heroni, T. flindersi, T.* (*Therioplectes*) *meridionalis* and *T.* (*T.*) *albohirtipes.*

CHEIREDDIN (—), GOLDBERG (L.) & NESCHAT OMER (—). **Trypanosomiasis der Kamele in Palästina.**—*Sitzungsber. K. Akad. Wiss., Vienna,* Abt. 3, cxxvi, 1917, pp. 17–26, 2 plates. [Received 6th April 1921.]

The life-cycle of a trypanosome isolated from camels during the campaign in Palestine in 1915 is described. Experimentally the disease has been transmitted to horse, mule, donkey, dog, cat, rabbit, guinea-pig, rat, cattle, goat and sheep, but the mode of transmission under natural conditions has not been definitely ascertained. Biting flies are the suspected factors, but brief experiments made with Tabanids caught in the infested area gave negative results.

LEGENDRE (J.) & OLIVEAU (A.). **Rôle du Lapin domestique dans l'Attraction et la Nutrition d'** *Anopheles maculipennis.—C. R. Hebdom. Acad. Sci., Paris,* clxxii, no. 13, 29th March 1921, pp. 822–823.

Further experiments confirm those already noticed [*R.A.E.*, B, viii, 98] with reference to the preference shown by *Anopheles maculipennis* for the blood of rabbits. The mosquitos congregate on the ceiling in rabbit hutches, a habit that should simplify their destruction.

RODHAIN (J.). **Un Sarcoptidé, nouveau Parasite de la Roussette africaine** (*Eidelon helvum*, **Kerr**).—*C. R. Soc. Biol., Paris,* lxxxiv, no. 14, 23rd April 1921, pp. 757–759.

A brief description is given of a new Sarcoptid mite found infesting a bat (*Eidelon helvum*) in the Belgian Congo.

RODHAIN (J.) & GEDOELST (L.). **Les Affinités du Sarcoptidé de l'***Eidelon helvum.—C. R. Soc. Biol., Paris,* lxxxiv, no. 14, 23rd April 1921, pp. 759–760.

The systematic position of the Sarcoptid mite recorded in the previous paper is discussed, and the name *Nycteridocoptes pteropi* is proposed for it.

HYLKEMA (B.). **De Ontwikkeling van de Parasiet der Quartana in de** *Myzomyia ludlowi* **en haar Overbrenging op den Mensch.** [The Development of the Parasite of Quartan Malaria in *Anopheles ludlowi* and its Transmission to Man.]—*Meded. Burg. Geneesk. Dienst Ned.-Indië, Batavia,* 1920, no. 6, pp. 50–99, 2 plates. (Also in English). [Received 5th May 1921.]

These experiments in the transmission of quartan malaria to man were made at Belawan, an island mostly covered with mangrove, which is the sea-port of the east coast of Sumatra and in which *Anopheles* (*Myzomyia*) *ludlowi* is the only Anopheline found.

As the mosquitos could in most cases be infected to the extent of 100 per cent. with subtertian, it was natural to expect them to be not less susceptible to quartan malaria. It was found that they could regularly be infected with quartan to the extent of 20 per cent. and occasionally to 50 per cent. The percentage of mosquitos that could be infected increased in proportion to the number of gametes in the blood of the gamete-carriers. In 11–13 days after the gametes had been introduced, the mosquitos proved capable of transmitting the infection to man ; the period of incubation until the prodromal attack amounted to a further 12 days. The period of development of quartan in *A. ludlowi* lasts at the most only a little longer than that of subtertian at the same temperature (about 23°–31° C. = 73°–87° F.). The quartan cysts, which from the beginning are smaller than those of subtertian, grow less quickly. It is not possible to distinguish between quartan and subtertian cysts by means of the pigment only, as the differences in it are too unimportant and too inconstant. In both, the pigment fades and diminishes when the cysts grow larger; it then changes from coarse to fine. A period of captivity lasting longer than usual, involving a more advanced age, lessens the susceptibility of *A. ludlowi* to quartan infection and delays the growth of the quartan cysts; it does not lessen the susceptibility of the mosquito to subtertian malaria and only slightly delays the growth of the subtertian cysts.

Martini (E.). **Ueber Stechmücken- und Kriebelmückenzucht.** [The artificial Breeding of Mosquitos and Simuliids.]—*Arch. Schiffs- u. Trop.-Hyg., Leipsic,* xxv, no. 4, April 1921, pp. 120–121.

Methods for breeding *Aëdes* larvae, for feeding those of *Anopheles* and *Stegomyia,* and for breeding Simuliids, are briefly described. It is stated that *Stegomyia fasciata* and *A. plumbeus* (*nigripes*) are the most suitable species of mosquitos for breeding in the laboratory.

Sikora (H.). **Ueber die Züchtung der** *Rickettsia pediculi.* [The Breeding of *Rickettsia pediculi.*]—*Arch. Schiffs- u. Trop.-Hyg., Leipsic,* xxv, no 4, April 1921, pp. 123–124.

Laboratory methods of breeding *Rickettsia pediculi,* the harmless micro-organism found in the stomach in lice, are described. *R. prowazeki,* found in the epithelial cells of the stomach in lice, is the causal agent of typhus.

Bogdanova-Katkova (L. I.) **Краткій предварительный Отчетъ о Работахъ Энтомологическаго Отдѣла въ 1916 году.** [Brief preliminary Report of the Work of the Entomological Department in 1916.]—**Записки Энтомологическаго Отдѣла Николаевской Опытной Станціи** [*Bull. Ent. Dept., Nikolaevsk Expt. Sta.*], *Petrograd,* pt. 1, 1918, pp. 43–61, 3 figs.

[Received 13th May, 1921.]

The blood-sucking and other flies recorded in this report include *Haematopota pluvialis,* L., *H. crassicornis,* Wahlb., *Tabanus tarandinus,* L., *T. tropicus,* Panz., *T. fulvicornis,* Meig., *T. montanus,* Meig., *T. solstitialis,* Lunb., *T. luridus,* Fall., *T. confinis,* Zett., *T. bovinus,* L., *Hypoderma bovis,* L., *Gastrophilus intestinalis* DeG. (*equi,* Cl.), *Stomoxys calcitrans,* L., and *Musca domestica,* L.

Phibbs (G. B.). **Variations in the segmental Spines of the fourth-stage Larva of** *Hypoderma bovis.*—*Irish Naturalist, Dublin,* xxx, no. 5, May 1921, pp. 53–57, 4 figs.

The observations here described show that the number and character of the spines of the larva of *Hypoderma bovis* cannot be taken as an indication that more than four larval stages occur.

Kotlán (S.). **Az ixodidák mely fajai közvetitik a piroplasmosist Magyarorszagon?** [What Kinds of Ixodids transmit Piroplasmosis in Hungary?]—*Allatorvosi Lapok, Budapest,* xlii, no. 5, 8th March 1919, pp. 34–35.

The author states that piroplasmosis of domestic animals has been well known for a long time in Hungary, where it is known as "forest disease" or "red water" and has been popularly supposed to be caused by eating the young shoots or buds of coniferous trees.

The following ticks are recorded from Hungary: *Ixodes ricinus*, L., *Dermacentor reticulatus*, F., *Rhipicephalus bursa*, C. & F., *Hyalomma aegyptium*, L., *Haemaphysalis punctata*, C. & F., and *Haemaphysalis concinna*, Koch.

In the author's opinion piroplasmosis of cattle in Hungary is transmitted by *Ixodes ricinus*; that of sheep probably by *Rhipicephalus bursa*, as Motas has demonstrated to be the case in Rumania. In view of the fact that piroplasmosis of horses is common in Albania, Rumania and Macedonia, it is thought that it will be found to be prevalent in the more wooded parts of Hungary also, but a more extensive knowledge of the tick fauna is required before the disease can be studied.

Kotlán (S.). **Adatok a hazai kullancs-fauna ismeretehez.** [Contribution to Knowledge relating to Hungary's Ixodid Fauna.]—*Állattani Közlemények, Budapest,* xviii, no. 1–4, 7th May 1921, pp. 33–36 and 48.

This paper emphasises the scantiness of information on Hungarian Ixodidae, and the works of earlier Hungarian authors on these ticks are reviewed.

From these it appears that the only Ixodids known from Hungary in 1914 were: *Ixodes vespertilionis*, Koch, *I. ricinus*, L., *I. hexagonus*, Leach, on dogs near Budapest, *Rhipicephalus bursa*, C. & F., from south Hungary, and *Dermacentor reticulatus*, F., from Budapest and the Transdanubian provinces on cattle, sheep and horses. Since that date the author has found *Rhipicephalus sanguineus*, Latr., rare and occurring only in the southern part of the country; *Hyalomma aegyptium*, L., in Transsylvania and near Budapest on cattle; *Haemaphysalis concinna*, Koch; *H. cinnabarina punctata*, C. & F., and *H. otophila*, Schultze, in the Transdanubian provinces on horses and dogs.

It seems probable that the tick fauna of Hungary, owing to its geographical position, is transitional between that of the states to the north and south. *Hyalomma aegyptium* came from the south, probably from Rumania, and it is spreading northward from the neighbourhood of Budapest. The same is true of *Rhipicephalus bursa* and *R. sanguineus*, which are only found in southern Hungary. *Haemaphysalis otophila* is at present only known from the Balkans, but as other species of this genus such as *H. concinna* and *H. punctata* are cosmopolitan and can live in cold climates, it is probable that it may spread to the north.

No species of the notorious genus *Boophilus* has been found in Hungary, but the author has received *B. annulatus calcaratus* from Albania on donkeys and horses.

HENRIKSEN (KAI L.). **Et nyt Tilfaelde af** *Hypoderma bovis* **hos Mennesket.** [A new case of *Hypoderma bovis* on man.]—*Entom. Meddel., Copenhagen,* xiii, no. 6, 1921, p. 297.

A case is recorded of the larva of *Hypoderma bovis* infesting a boy and causing a whitish swelling on the arm. The larva was removed by means of a hot fomentation.

Malaria Control at Savannah, Ga.—*Pub. Health Repts., Washington, D.C.,* xxxvi, no. 14, 8th April 1921, pp. 705–706.

During 1920 in and around the city of Savannah on an area of 25 square miles with a population of 100,000 persons, approximately £10,000 (at par) was spent in anti-malaria operations.

Some abandoned rice fields, owing to the neglect of dykes, tide gates and ditches, and to their being flooded periodically, were prolific breeding places of *Anopheles quadrimaculatus* and *A. crucians.* The control work included the repairing of tide gates and dykes, and construction of additional gates. Elsewhere, control by larvicidal fish, draining and oiling were the measures adopted, with regular inspections of likely breeding places.

It was found that in the latter part of 1919 there were 5½ times as many cases of malaria as during a similar period in 1920 following these operations.

It was recommended that £6,000 should be spent in the extension and maintenance of anti-malaria work in 1921.

PIERCE (W. D.), HUTCHISON (R. H.) & MOSCOWITZ (A.). **Modern Steam Laundry Processes as a Means of Destroying Vermin.**—*Pub. Health Repts., Washington, D.C.,* xxxvi, no. 14, 8th April 1921, pp. 710–717.

The experiments here described to determine whether the washing of woollens by modern steam laundries completely destroys body lice (*Pediculus humanus* var. *corporis*) have already been noted [*R.A.E.*, B, viii, 158].

JOHANNSEN (O. A.). **The first Instar of** *Wohlfahrtia vigil,* **Walker.**—*Jl. Parasitology, Urbana,* vii, no. 3, March 1921, pp. 154–155.

The Sarcophagid, *Wohlfahrtia vigil,* Wlk. [*R.A.E.*, B, ix, 1], is apparently larviparous. The first larval instar is here described.

YAMADA (S.). *Anopheles* **Mosquito. A new Species found in Hokkaita, Japan.**—*Taiwan Igakukai Zasshi* (*Jl. Formosa Med. Soc.*) no. 186, 28th April 1918, p. 528. (Abstract in *China Med. Jl., Shanghai,* xxxv, no. 2, March 1921, p. 177).

Some description is given of an unnamed Anopheline mosquito, recorded from Hokkaita, Japan, which is apparently new. It resembles *A. hyrcanus* (*sinensis*) and the Indian species, *A. lindesayi.*

Koike (S.). **The Caterpillar (probably** *Euproctis flava subflava,* **Bremer) causing urticarial Dermatitis in Kwan San.**—*Gunidan Zasshi* (*Jl. Military Surgeons, Japan*), no. 76, 30th April 1918, pp. 206–210, 1 plate. (Abstract in *China Med. Jl., Shanghai,* xxxv, no. 2, March 1921, p. 177–178).

The caterpillar here described was the cause of an outbreak of dermatitis among Japanese troops on manoeuvres.

Blacklock (B.). **Notes on a Case of Indigenous Infection with** *P. falciparum.*—*Ann. Trop. Med. & Parasit., Liverpool,* xv, no. 1, 27th April 1921, pp. 59–72, 2 figs.

A case is recorded of a patient suffering from an acute primary attack of malignant tertian malaria, due to *Plasmodium praecox* (*falciparum*), which proved fatal. The infection was probably acquired at a northern health resort where *Anopheles maculipennis, A. bifurcatus* and *A. plumbeus* are plentiful. The patient had never been out of the British Isles.

Blacklock (B.) & Carter (H. F.). **Observations on Mosquitoes in the Isle of Man.**—*Ann. Trop. Med. & Parasit., Liverpool,* xv, no. 1, 27th April 1921, pp. 73–90, 5 plates, 1 map.

The mosquitos recorded from the Isle of Man are: *Anopheles bifurcatus,* L., *A. maculipennis,* Mg., *A. plumbeus,* Steph., *Culex pipiens,* L., *Theobaldia annulata,* Schr., *T.* (*Culicella*) *morsitans,* Theo., and *T.* (*C.*) *fumipennis,* Steph. Details are given of the type of locality in which each species occurred, and also the names of the places, arranged alphabetically.

Hill (G. F.). **Notes on some unusual Breeding Places of** *Stegomyia fasciata,* **Fabr., in Australia.**—*Ann. Trop. Med. & Parasit., Liverpool,* xv, no. 1, 27th April 1921, pp. 91–92, 1 plate.

Stegomyia fasciata, F., and *Ochlerotatus notoscriptus,* Skuse, are recorded from Australia as breeding in a tin containing about 5 inches of water and some decaying leaves which was found in dense scrub, 600 yds. from the nearest dwelling. In addition to *Macleaya tremula,* Theo., and *O. quasirubrithorax,* Theo., *S. fasciata* was also taken from a rot-hole in a *Poinciana* tree.

Hill (G. F.). *Musca domestica,* **L., as a " Bush Fly " in Australia.**—*Ann. Trop. Med. & Parasit., Liverpool,* xv, no. 1, 27th April 1921, pp. 93–94.

Musca domestica, L., is recorded from Australia on freshly skinned buffaloes that had been shot in scrub country from 3 to 6 miles from the nearest habitation. In the bush and open grazing country *M. domestica* oviposits on fresh horse manure, but will also breed in decaying vegetable matter. Adults have been bred from larvae taken in nests of the black-throated grebe (*Podicipes novae-hollandiae*) which had become stranded on the margin of a swamp and in which the eggs had not hatched. *Stomoxys calcitrans* and *Sarcophaga* sp. were breeding in the same nests and also in leaves, horse and cow manure, etc., on the margin of the swamp. At a distance of from 2 to 2½ miles from any habitation *M. domestica* was found associated with *M. lusoria* Wied. (*australis*, Macq., *fergusoni*, J. & B.), *M. nebulo*, F. (*hilli*, J. & B.), *M. ventrosa*, Wied. (*nigrithorax*, Stein), and *M. humilis*, Wied. (*vetustissima*, Wlk.).

NEWSTEAD (R.) & EVANS (A. M.). **New Tsetse-flies (*Glossina*) from the Belgian Congo.**—*Ann. Trop. Med. & Parasit., Liverpool*, xv, no. 1, 27th April 1921, pp. 95–102, 6 figs.

Glossina schwetzi, sp. n., and *G. fusca* var. *congolensis*, n., are described. Tables are given to distinguish the genital armature of both sexes of *G. schwetzi* and *G. tabaniformis* and of *G. fusca* and the new variety of it.

NEWSTEAD (R.) & SINTON (J. A.). **On a Collection of Pappataci Flies (*Phlebotomus*) from India.**—*Ann. Trop. Med. & Parasit., Liverpool*, xv, no. 1, 27th April 1921, pp. 103–106.

The species recorded are: *Phlebotomus papatasii*, Scop., *P. minutus*, Rond., *P. minutus* var. *antennatus* Newst., *P. sergenti*, Parrot, and *P. major*, Annandale. With the exception of the last-named, which was taken at Simla, numerous examples of all these species were caught in the north-west Provinces.

The difference in the antennal segments upon which the erection of a new species *P. antennatus* [*R. A.E.*, B, 1, 34] was based, can no longer be considered of specific importance; this is therefore now treated as a variety of *P. minutus*.

BLACKSHAW (G. N.). **Arsenical Poisoning of Cattle.**—*Rhodesia Agric. Jl., Salisbury*, xviii, no. 2, April 1921, pp. 188–190.

The commoner causes of loss of cattle by arsenical poisoning are enumerated, and can be avoided if the following precautions are taken.

All drums containing the dip when in use should be carefully supervised and kept locked up. Empty drums should be washed, and the refuse buried. The capacity of the dip tank should be known in order to adjust the strength of the solution before dipping. Draining pens should be so constructed that dip cannot collect in them, and drying kraals efficiently drained to prevent accumulation of arsenic. Cattle should not be given access to land that has been splashed or saturated with the dipping solution, and should be prevented from drinking contaminated water. Tanks liable to flooding or overflowing should be protected by drains.

CONNAL (A.). **Observations on *Filaria* in *Chrysops* from West Africa.**—*Trans. R. Soc. Trop. Med. & Hyg., London*, xiv, no. 6, 18th February 1921, pp. 108–109.

Dissections were made of 2,255 individuals of *Chrysops silacea*, Aust., and *C. dimidiata*, Lw., collected near Sapele, two days' journey eastward from Lagos. This district has the reputation of being heavily infested with blood-sucking Diptera, and a considerable percentage of the inhabitants, both European and native, are infected with *Filaria* (*Loa*) *loa*, as shown by the presence of embryos in the peripheral blood.

Dissections showed 0·8 per cent. of *C. silacea* infected, and 2·4 per cent. of *C. dimidiata*. May, June and July are the wettest months, and the largest number of flies was collected during this period. Infected flies in many cases contained hundreds of filarial organisms, situated mostly in the thoracic muscles. In two cases the mouth-parts were infected.

In the discussion following the reading of this paper, it was suggested that *Chrysops* should be reared in captivity in order to get clean stock and that these should be fed on cases of infection with embryos of *F. loa* in the blood. The flies could then be dissected daily, and sections should be cut to show exactly where the development takes place. By this means it should be possible to decide finally the position of *C. silacea* and *C. dimidiata* as intermediate hosts of *F. loa*.

LAVERAN (A.) & FRANCHINI (G.). **Spirochétose de Punaises des Euphorbes et du Latex.**—*Bull. Soc. Path. Exot., Paris*, xiv, no. 4, 13th April 1921, pp. 205–207, 2 figs.

In their study of flagellates occurring in *Euphorbia* [*R. A.E.*, B, ix, 58, 106] the authors have found that the bugs that are the usual carriers of the disease are sometimes infected with spirochaetes, and not flagellates, and that this also applies to *Euphorbia*. Spirochaetes have been found in the Lygaeid bugs, *Nysius* sp. and *Lygaeus pratensis*, and in *Anthocoris sylvestris*. In the latex of *Euphorbia peplus* a few spirochaetes (*Herpetomonas*) have been observed.

MONTPELLIER (J.), DEGOUILLON (—) & LACROIX (A.). **Note complémentaire sur la Gale filarienne et son Évolution.**—*Bull. Soc. Path., Exot., Paris*, xiv, no. 4, 13th April 1921, pp. 211–214.

Observations of 800 Senegalese troops showed that 156 had tumours due to *Onchocerca volvulus* or were affected with filarial mange, and in these 156, signs of filarial eruption were present in 150, of whom 98 harboured filarial cysts and 6 had tumours and no traces of eruption.

Thus 65 per cent. of the cases of filarial mange harboured cysts of *O. volvulus* and only 4 per cent. had tumours without filarial mange.

This is claimed to confirm the conclusions previously reached [*R. A.E.*, B, viii, 183] as to the close relation between onchochercosis and filarial mange.

CHATTON (E.) & COURRIER (R.). **Sur un Trypanosome de la Chauve-souris,** *Veperugo pipistrellus*, **à Formes crithidiennes intratissulaires et cystigènes. Hypothèse relative a l'Étiologie du Goître endêmique.**—*C. R. hebdom. Acad. Sci., Paris*, clxxii, no. 20, 17th May 1921, pp. 1254–1257.

A species of *Schizotrypanum* is recorded from bats (*Vesperugo pipistrellus*) in lower Alsace. The possibility of this trypanosome being the causal agent of goitre is discussed, and its probable transmission by insects is suggested. Its life-cycle is described.

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Top Minnows as Yellow Fever Eradicators.—*Science, Lancaster, Pa.,* liii, no. 1375, 6th May 1921, pp. 432–433.

In view of the success that has attended the use of the top minnow (*Gambusia*) in eradicating malarial mosquitos in various parts of the United States, this method has been adopted for the eradication of the yellow fever mosquito [*Stegomyia fasciata*] at Tampico, Mexico, in preference to oiling.

de Stefani (T.). **Importanza dell'Entomologia applicata nell' Economia sociale. Entomologia legale e dei Cadaveri.** [The Importance of Applied Entomology in Social Economy. Legal Entomology in relation to Dead Bodies.]—*Allevamenti, Palermo,* ii, no. 5, 1st May 1921, pp. 131–133.

Dead bodies are attacked by different series of insects, each of which appears at a given stage of decomposition, a fact of practical value in legal questions.

The first to appear are *Musca domestica, Muscina* (*Cyrtoneura*) *stabulans* and *Calliphora vomitoria.* These are followed by *Lucilia caesar, Sarcophaga carnaria, S. arvensis* and *S. laticrus.* A third series, appearing at the butyric stage of fermentation, includes the Coleoptera, *Dermestes lardarius, D. fritschii* and *D. undulatus,* and a moth, *Aglossa pinguinalis.* A fourth, casein, phase of fermentation attracts a new group of Diptera, including *Piophila casei* [cheese maggot] and *Anthomyia* spp.; the latter only occur in the country and never in towns, so that their presence may indicate the locality where death took place. This fourth group also includes small beetles of the genus *Corynetes,* such as *C. ruficollis* and *C. coeruleus.*

Ammoniacal fermentation follows, attracting the flies *Tyreophora cynophila, T. furcata, T. anthropophaga, Lonchaea nigrimana, Ophyra cadaverina* and *Phora aterrima,* and Coleoptera such as *Necrophorus fossor, Silpha littoralis, S. obscura, Hister cadaverinus* and *Saprinus rotundatus.* The larvae of the insects of this last group are those specially engaged in reducing the remains to dust. Quite apart from the groups mentioned are the Acari, which appear at the same time and the action of which tends to mummify the body without decomposition. They include *Uropoda nummularia, Trachynotus cadavericus, Glyciphagus cursor, G. spinipes, Tyroglyphus* spp., *Serrator* spp. and *Coepophagus* spp. The mummified or partly mummified body attracts certain species of *Dermestes, Attagenus* and *Anthrenus,* and such Lepidoptera as *Aglossa pinguinalis, A. cuprealis, Tinea pellionella* and *Tineola biselliella.* The very last fragments are attacked by the larvae of two Coleoptera, *Tenebrio obscurus* and *Ptinus brunneus.*

A number of cases are instanced where the presence of insects enabled the time and place of death to be ascertained.

Cura da "Peste das Gallinhas" ou Espiroquetose. [The Cure of Spirochaetosis in Fowls.]—*Chacaras e Quintaes, S. Paulo,* xxiii, no. 4, 15th April 1921, p. 296, 1 fig.

This popular article contains data on the tick, *Argas persicus* (*miniatus*), which is the vector of spirochaetosis in fowls.

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de Beaurepaire Aragão (H.). **Carrapato do Chão.** [The Ground Tick.]—*Chacaras e Quintaes, S. Paulo,* xxiii, no. 4, 15th April, 1921, p. 298, 1 fig.

This is a brief note on the tick, *Ornithodoros rostratus,* Arag., which lives in and attacks the inhabitants of roughly constructed huts.

Schuurmans Stekhoven Jr. (J. H.). **Van de Wieg naar het Graf; enkele Grepen uit het Leven van de Schurftmijt van de Rat.** [From the Cradle to the Grave; some Parts of the Life of the Scab Mite of the Rat.]—*Tijdschr. Ned. Dierk. Ver.* (2), v. 18, Verslagen p. viii–xii, April 1919. (Notice in *Vakblad voor Biologen, Helder,* ii, no. 5, January 1921, p. 78.)

The various stages in the life-history of the scab mite of the rat are described as a result of careful observation of the isolated eggs, larvae, nymphs and adults. The rat concerned is probably *Mus decumanus* and the mite is probably *Notoedres muris,* Mégn., or perhaps *N. musculi,* Oud., or *N. alepis,* R & L.

Marchand (W.). **The Early Stages of Tabanidae (Horse Flies).**—*Rockefeller Inst. Med. Res., New York,* Monograph 13, 15th November 1920, 203 pp., 15 plates. [Received 21st May 1921.]

The object of this monograph is to collate information on the development and early stages of Tabanids, about which very little is known, although the subject is an important one in view of the rôle played by these flies in transmitting diseases of domestic animals. Previous literature on the subject is not only reviewed, but the facts found therein are quoted or reported, so that the work constitutes a valuable compendium of information on the subject. The fact that the data are all presented in English will, it is hoped, encourage English-speaking entomologists to make further investigations on the subject. Short descriptions are also given of the larvae of 14 unidentified species of *Tabanus,* with a list of the recorded parasites of flies of this family and a complete bibliography.

Hauer (C. E.). **A Guide to the Proper Rat-proofing of Buildings.**—*Pub. Health Repts., Washington, D.C.,* xxxvi, no. 17, 29th April 1921, pp. 930–940, 5 figs.

Various forms of rat-proofing for buildings are recommended. Attention is drawn to important minor details to be adopted in towns.

Artega (J. F.). **Malaria in Cuba.**—*Rev. Medicina y Cirurgia Habana,* June 1920. (Abstract in *Ann. d'Igiene, Rome,* xxxi, no. 3, March 1921, pp. 182–183.)

Malaria prophylaxis, neglected during the War for increased sugar production, must be vigorously prosecuted in Cuba, especially as regards anti-mosquito work. Besides possessing the conditions found elsewhere that are favourable to mosquitos, Cuba has a number of Bromeliaceous plants of the genera *Hohenbergia, Tillandria* and *Guzmania* that may serve as breeding-places owing to the water collected in their leaves. Against the larvae, petroleum, lime (15¾ grammes per cu. metre water), and carbide residue are recommended. Fumigation with sulphur, pyrethrum, leaves of *Stramonium,* creolin and tobacco are advised against the adults. A repellent for individual use is a mixture of essence of eucalyptus 30 grammes, talc 60 grammes and starch 120 grammes. Another mixture consists of clove oil 10 grammes, lanoline 30 grammes and glycerine ointment 100 grammes. The advantages of using quinine are illustrated by figures obtained from Italian statistics.

FALCIONI (D.). **L'Esito di una piccola Bonifica e la Diffusione delle Anofele.** [The Result of a small Drainage Scheme and the Spread of Anophelines.]—*Policlinico*, Sez. Prat. 1921, no. 4. (Abstract in *Ann. d'Igiene, Rome*, xxxi, no. 3, March 1921, p. 184.)

Cases of malaria were observed in dwellings close to more or less water-logged quarries, while others about 600 or more yards away remained immune. As a result of very rainy seasons the quarries became swamped and malaria became the predominating disease in the neighbouring houses. Oiling gave good results, but the drainage and drying up of the quarries effected a radical cure.

This case led to an examination of the question of the radius of influence of an Anopheline centre. It may be said that in practice small centres extend their influence to under 600 yards, while the large ones may do so up to 1,100–1,650 yards. The spread of malaria may be considered to be due to successive stages of travel by successive generations and not to an extended migration. To admit the latter would lead to the assumption that rural districts may be breeding places from which the Anophelines take neighbouring towns as their objectives—a phenomenon that does not occur in practice.

This case also shows the value of reclamation work on a small scale, it may be that many small efforts of a similar nature may prove more efficient than huge programmes that are difficult to carry out.

PIÑA (J. G.). **Plagas del Ganado Vacuno en el Estado de Jalisco y Modo de combatirlas.** [Diseases of Cattle in the State of Jalisco and Means of Combating them.]—*Rev. Agric., San Jacinto, D.F.*, v, no. 10, February 1921, pp. 712–715, 1 map. [Received 28th May 1921.]

In the State of Jalisco and the surrounding region, comprising the greater part of the north-western States of Mexico, stock-raisers lose thousands of heads of cattle every year from some disease, the nature of which is not exactly known, and for which no remedy has been found. The diseased cattle are generally free from ticks, and the author has been unable to detect any parasite or other organism that might be the causal agent. The popular belief is, however, that biting-flies are responsible for the high rate of mortality, and it has frequently been observed that after a bite from a fly animals show signs of disease and eventually die. The symptoms of the disease are described, and the author is inclined to ascribe them to trypanosomiasis, as almost certainly some blood parasite is the cause.

ZOTTA (G.). **La Granulation azurophile dans les Leucocytes de** *Carausius (Dixippus) morosus* **et de la Chenille de** *Galleria mellonella*.—*C. R. Soc. Biol., Paris*, lxxxiv, no. 18, 21st May 1921, pp. 928–930.

Azurophil granulations as studied in constituents of the body fluid of adults of *Carausius morosus* and the larvae of *Galleria mellonella* present the same properties as similar constituents of human blood.

In both cases the successive stages of the evolution of these granulations have been traced, and as a result of their quantitative and qualitative development it is thought probable that they play a definite part in the developmental activity of the leucocytes.

Larrousse (F.). **Etude systématique et médicale des Phlébotomes.**—*Paris*, Vigot Frères, 1921, 106 pp., 20 figs.

Many scattered papers on the biology, classification and pathogenic rôle of *Phlebotomus* spp. have been published. The author's aim is to present a fairly complete survey of the knowledge now available on these Psychodids without attempting to deal exhaustively with this vast subject.

The first chapter deals with the anatomy and biology of the genus, and includes Skuse's key to the families of Nematocera. Notes on the preparation of specimens are given. The parasites found in *Phlebotomus* are mentioned and briefly discussed.

The second chapter deals with the various species, giving the distinctive characters and habitat. They are divided into European, African, Asiatic and American groups (no Australian species being as yet known) with a specific key for each group.

The third chapter concerns the part played by these flies as disease-carriers. Three-day fever has been proved to be transmitted by them ; their rôle is not yet definitely established as regards Oriental sore, American leishmaniasis or verruga in Peru.

The author refers to the difficulty in systematic study caused by varying methods of description and to the difficulties of identifying the females [*R.A.E.*, B, ix, 22]. Doubtful points in the biology of these flies can only be settled by breeding.

Iyengar (M. O. T.). **Preliminary Report of a Malaria Survey of Calcutta and Environs.**—*Ind. Jl. Med. Res., Calcutta*, Spec. Ind. Sci. Congress no., 1920, pp. 8–17. [Received 30th May 1921.]

The mosquitos recorded from Calcutta during a two years' survey are *Anopheles subpictus*, Grassi (*rossi*, Giles), *A. barbirostris*, Wulp, *A. hyrcanus*, Pall. (*sinensis*, Wied.), *A. jamesi*, Theo., *A. fuliginosus*, Giles, *A. minimus*, Theo., var *aconitus*, Dön. (*listoni*, List., var. *alboapicalis*, Theo.), *A. stephensi*, List., *Desvoidya obturbans*, Wlk., *Stegomyia fasciata*, F., *S. scutellaris*, Wlk., *Mimomyia chamberlaini*, Ludl. (*Radioculex clavipalpus*, Theo.), *Culex* (*Leucomyia*) *gelidus*, Theo., *Culex impellens*, Wlk., *C. fatigans*, Wied., *C. concolor*, R.—D., *Mansonioides annulifera*, Theo., *Aedomyia squamipennis*, Arr., *Ficalbia minima*, Theo. (*Mimomyia minuta*, Theo.), and a species not yet identified.

During January and February the numbers of *Culex fatigans* and *C. impellens* increase suddenly in the central part of Calcutta and in the southern and eastern suburbs, about the time of the easterly winds from the Salt Lakes. *Anopheles minimus* var. *aconitus* generally breeds in ponds, but may also be found in roadside drains in which the rainwater collects during the monsoons. *A. stephensi* is very prevalent in the densely populated areas of the town and probably gives rise to a considerable amount of malaria. It can breed in rain water in old tins on house terraces. The presence of silt in the water does not prevent its breeding.

Culex concolor was found associated with *A. stephensi* and is destructive to all other mosquito larvae. *Desvoidya obturbans* is also a predaceous species, feeding on larvae of *Culex gelidus* and *A. subpictus*. It is also a cannibal and will breed in stagnant water.

Toxorhynchites marshalli is common in Calcutta. The members of this genus destroy *Stegomyia* spp., but have not been observed to attack Anopheline larvae.

Malaria has been increasing in Calcutta during the last few years, and the malarial parasite is always present. The abundance of *A. stephensi* points to the need for further investigations and for active remedial measures, supported by adequate legal powers. The best measure would be to introduce a continuous water supply, and this would also control *Stegomyia*.

CRAGG (F. W.). **The Maggot Trap : A Means for the Safe Disposal of Horse Manure and similar Refuse.**—*Ind. Jl. Med. Res., Calcutta*, Spec. Ind. Sci. Congress no., 1920, pp. 18–21 [Received 30th May 1921.]

A maggot trap, the principle of which has already been noticed [*R. A.E.*, B, iii, 134] is advocated for the destruction of the larvae of house-flies [*Musca domestica*] in India. The breeding of mosquitos in the trough may be prevented by frequently changing the water.

CRAGG (F. W.). **A Note on Relapsing Fever in India, with special reference to its Seasonal Prevalence.**—*Ind. Jl. Med. Res., Calcutta*, Spec. Ind. Sci. Congress no., 1920, pp. 22–28. [Received 30th May 1921.]

In the United Provinces epidemics of recurrent fever appear to occur chiefly in the hottest part of the year—in March, April and May. It therefore seems very unlikely that lice, *Pediculus*, are the transmitting agents in these epidemics. No doubt distinct forms of the disease occur, and should a form prove to be transmitted otherwise than by the louse, it will have to be regarded as a separate entity in spite of clinical similarity and the apparent identity of the organism. Brown has suggested a Pentatomid bug, *Bagrada picta*, as a possible transmitting agent.

CRAGG (F. W.). **The Distribution of the Indian Species of the Genus *Xenopsylla*, with Reference to the Immunity of certain Areas from Plague Epidemics.**—*Ind. Jl. Med. Res., Calcutta*, Spec. Ind. Sci. Congress no., 1920, pp. 29–34. [Received 30th May 1921.]

The Plague Commission in India recognised only one flea of the genus *Xenopsylla* on rats. This species, *X. cheopis*, has until recently been universally regarded as the predominant species on rats in tropical and sub-tropical climates, and as the transmitter of plague. The predominant species in Colombo, however, is *X. astia* [*R. A.E.*, B, ii, 38.] Actual transmission of the disease by this species was effected with great difficulty. In collections of fleas from many different parts of India the various species were represented as follows : 64·5 per cent. *X. cheopis*, 29·8 per cent. *X. astia*, 2·7 per cent. *X. brasiliensis* and 2·89 per cent. a species of *Ceratophyllus* distinct from *C. fasciatus*. Other species of *Xenopsylla* may be disclosed when more time can be devoted to the examination of the collection.

X. cheopis appears to be the predominant species in the colder parts of the country and *X. astia* in the warm and damp regions. *X. brasiliensis* was only found in Poona, Mangalore, Bombay City and Ootacamund. Should *X. astia* prove to be the species of the plague-free area, its rôle as a vector of the disease as compared with *X. cheopis* may be tested experimentally.

Sewell (E.). **A Note on the Importance of the Genus *Habronema* as an Economic Factor amongst the Equidae of the Punjab and the North-West Frontier Province.**—*Agric. Jl. India, Calcutta,* xvi, pt. 2, March 1921, pp. 152–155.

In the stomachs of horses and mules destroyed for chronic debility in the Punjab and the North-West Frontier of India serious lesions due to one or more species of *Habronema* were found in every case.

The life-histories of *H. megastoma*, *H. muscae* and *H. microstoma*, and remedial measures and treatment for them are quoted [*R.A.E.*, B, vi, 13, 202; vii, 118, 157; viii, 51].

Oil of chenopodium is recommended as a vermifuge. It can be used alone, or with chloroform followed by linseed oil and turpentine.

Root (F. M.). **Experiments on the Carriage of Intestinal Protozoa of Man by Flies.**—*Amer. Jl. Hyg.*, i, no. 2, March 1921, pp. 131–153, 3 plates, 8 tables.

Flies have been proved to carry cysts of intestinal protozoa, including *Entamoeba histolytica* which causes amoebic dysentery [*R.A.E.*, B, v, 117, 151], and the author describes experiments to prove whether these cysts pass through the flies entirely unaltered or are killed by too long a sojourn in the fly's alimentary tract.

It was found that free forms of *E. histolytica* and *Chilomastix mesnili* swallowed by flies die within an hour, never encysting. Motile *C. mesnili* have appeared in the fly's faeces 7 minutes after feeding on a stool containing them.

The survival of cysts of intestinal protozoa in the fly's intestine varies according to the species. Half the cysts of *E. histolytica* were dead after 15 hours, the last living surviving 49 hours. Half the cysts of *E. coli* were dead after 14 hours, the last living surviving 52 hours. Half the cysts of *Endolimax nana* were dead after 18 hours, the last living surviving 39 hours. Half the cysts of *Giardia intestinalis* were dead after 8 hours, the last living surviving 16 hours. Half the cysts of *C. mesnili* were dead after 36 hours, the last living surviving 80 hours. Cysts in drowned flies survive much longer. Half the cysts of *G. intestinalis* were dead after 2 days, the last living surviving 4 days, and those of *Entamoeba histolytica* survived 7 days, half of them dying in 3 days.

The amount a fly can eat depends on the period of starvation. Experiments prove that a common house-fly (*Musca domestica*) can digest 0·0068 cc. of fluid, and a single blow-fly (*Calliphora erythrocephala*) 0·022 cc.

An infection with *Herpetomonas muscae-domesticae* was only found in one of 225 specimens of *Musca domestica* examined at Baltimore. Two infections with *H. calliphorae* were found in 124 specimens of *C. erythrocephala.*

The relation of flies to the spread of intestinal protozoan infections appears to be that fly faeces are only dangerous to human beings if deposited on moist or liquid foods. Flies may deposit infective forms from a few minutes after feeding until the cysts are dead. The earlier hours are the most dangerous as the larger proportion of cysts are then alive. It is possible that human beings may be infected by swallowing liquid in which flies have been drowned, as cysts live about a week in these cases.

Balfour (A.). **The Future of Research in Tropical Medicine: Facilities in Mauritius.**—*Brit. Med. Jl., London,* no. 3153, 4th June 1921, pp. 834–835.

The advantages and facilities for entomological research work in Mauritius are discussed, and suggestions are made for work on problems still requiring elucidation.

Cleland (J. B.), Bradley (B.) & MacDonald (W.). **Further Experiments in the Etiology of Dengue Fever.**—*Jl. of Hyg., Cambridge,* xviii, no. 3, October 1919, pp. 217–254, 9 charts.

The conclusions reached in previous observations are reviewed [*R.A.E.*, B, iv, 196; vi, 213; vii, 61]. The experiments with *Culex fatigans* and *Stegomyia fasciata* described in the present paper support the theories suggested in the earlier papers with regard to the relation of these mosquitos to dengue fever.

S. fasciata is clearly capable of carrying the infection; *C. fatigans* is probably not a vector of the disease; and experiments with *Ochlerotatus* (*Culicelsa*) *vigilax* were inconclusive.

Much information is given with regard to the virus of the disease, its nature, period of incubation and infectivity, distribution in the blood, and transmission by injection. A detailed report of the cases dealt with in the series of experiments is appended.

Buxton (P. A.). **Carriage of Coliform Bacilli by the Oriental Hornet (*Vespa orientalis*, Fabr.).**—*Jl. of Hyg., Cambridge,* xix, no. 1, July 1920, pp. 68–71.

Vespa orientalis, F., frequents butchers' shops and fruit shops, and also feeds on faeces, carrion and all sorts of house refuse in Mesopotamia. Examination of the gut contents led to the conclusion that this wasp is nearly as heavily infected with pathogenic coliform organisms as the house-fly [*Musca domestica*], but as it rarely invades kitchens and mess-rooms, it is probably of slight importance.

Gill (C. A.). **Malaria in England, with special reference to the Rôle of Temperature and Humidity.**—*Jl. of Hyg., Cambridge,* xix, no. 3, January 1921, pp. 320–332, 1 map.

In India the transmission of malaria appears to be chiefly confined to periods when the monthly mean temperature is not less than 61° F., and the monthly mean relative humidity not less than 63 per cent. (as measured at 8 a.m.).

As the humidity in England is never below 70 per cent., the temperature should be the sole factor limiting infection. It is only during July and August, and only in certain parts of the country, that the mean temperature reaches 61° F. It was found that in areas in which the mean is over 62° F., 86·6 per cent. cases occurred; in areas of 61°–62°, 10·4 per cent. cases occurred; in areas of 60°–61° F., only 3 per cent. cases occurred; and no cases occurred in areas under 60° F. These findings favour the author's conclusions as to the influence of meteorology on malaria in India [*R.A.E.*, B, ix, 86].

Pratt-Johnson (J.). **The Distribution of Malaria in South Africa and a Mosquito Survey of Military Hospital Areas.**—*Jl. of Hyg., Cambridge,* xix, no. 4, March 1921, pp. 344–349.

The information given has been compiled chiefly from the reports of Government Medical Officers and Health Officials circularised regarding the areas affected in each district, the type or types of malaria existing, the incidence of the disease, and the Anophelines identified.

In spite of the introduction, since 1915, of infective material, no indigenous cases of malaria seem to have occurred near East London, and Anophelines are not common there. The larvae of *Anopheles* (*Myzorhynchus*) *paludis,* considered to be identical with *Anopheles mauritianus,* have been found. On one occasion a single imago of *A.* (*M.*) *natalensis* was taken, but its breeding-place remained unlocated.

Prior to 1918 no cases of malaria had been reported in Durban for 10 years, but some have occurred since at an Indian labour camp and in its neighbourhood. The mosquitos identified were *Anopheles* (*Pyretophorus*) *costalis* and *A. mauritianus.* The Durban corporation maintains a mosquito brigade.

In the Northern Transvaal there were outbreaks of malaria of a malignant type in 1912 and 1913. A benign type is found every year along the rivers.

A mosquito survey of military hospital areas gave the following result :—From Roberts Heights : *Anopheles costalis, A. squamosus, A. mauritianus, Stegomyia simpsoni, Ochlerotatus caballus, Theobaldia longiareolata, Culex tipuliformis, C. tigripes* and *C. fatigans.* From Potchefstroom : *A. squamosus, Banksinella lineatopennis, O. caballus, T. longiareolata* and *C. fatigans.* From Cape Town : *A. cinereus, A. mauritianus, T. longiareolata, A. tipuliformis, C. tigripes, C. pipiens, C. fatigans* and *C. salisburiensis.* From Durban : *A. mauritianus, A. squamosus, S. fasciata, S. simpsoni* and *C. fatigans. A. costalis* was also found in Durban, but not in the hospital area there.

Craig (C. F.). **The Etiology of Dengue Fever.**—*Jl. Amer. Med. Assoc., Chicago, Ill.,* lxxv, no. 18, 30th October 1920, pp. 1171–1176.

This is a summary of present-day knowledge of the etiology of dengue. The author concludes that this fever is caused by a parasite very closely related to that believed to cause yellow fever (*Leptospira icteroides*), and that a search for a similar organism offers the most promising chance of demonstrating the causal agent.

While it appears to be proved beyond question that *Stegomyia fasciata* transmits this disease in Australia, the author is also of opinion that it has not yet been proved that *Culex fatigans* cannot transmit the infection.

Connor (M. E.). **Yellow Fever Control in Ecuador. Final Report.**—*Jl. Amer. Med. Assoc., Chicago, Ill.,* lxxv, no. 18, 30th October 1920, pp. 1184–1187, 2 figs.

The previous report has already been noticed [*R.A.E.*, B, ix, 6]. A very definite correlation was established between the number of tanks forming breeding places of *Stegomyia* [*fasciata*] and the number of yellow fever cases. The disease was eradicated by rendering the tanks mosquito proof. Fish are not recommended for tanks. The rise and fall in the percentage of smaller containers (barrels, tins, etc.) in which *Stegomyia* bred had no effect on the incidence of the disease, nor did rainfall bear any direct relation to the number of cases.

REICHENOW (E.). **Ueber das Vorkommen der Malariaparasiten des Menschen bei den Afrikanischen Menschenaffen.** [Occurrence of the Malaria Parasites of Man in African Anthropoid Apes.]—*Centralb. f. Bakt., Parasit. u. Infektionskr., Jena,* Ite. Abt. Orig., lxxxv, no. 3, 1st November 1920, pp. 207–216, 3 figs., 1 plate.

The author asserts that all the malarial parasites of man occur in the gorilla and chimpanzee in West Africa (Kamerun), and that these apes may be a source of infection to Europeans in areas where there are no native settlements. The danger, however, is infinitesimal so long as the negro population constitutes a source of infection.

The author has found parasites in apes that he identifies as *Plasmodium vivax* and *P. malariae.*

DE MELLO (F.) & JACQUES (J. E.). **Note sur l'Existence de l'***Herpetomonas muscae-domesticae* **à l'Inde portugaise.**—*Bol. Ger. Med. e Farmacia, Nova-Goa,* v, no. 5, May 1919, pp. 194–195.

Extreme polymorphism and a very great length of flagellum were noticed in *Herpetomonas muscae-domesticae,* infesting less than 1 per cent. of the house-flies in Goa.

MARXER (A.). **Die Beziehungen der Gastrophilus-Larven zur infektiösen Anämie.** [The Relationship between the Larvae of *Gastrophilus* and [equine] infectious Anaemia.]—*Ztschr. f. Immunitätsf. u. Experim. Therap.,* Ite. Teil. Orig., xxix, no. 1–2, 13th February 1920, pp. 1–10, 1 chart. (Abstract in *Trop. Vet. Bull., London,* viii, no. 3, 30th September 1920, p. 247.)

This work was done as a result of the studies published by MM. Seyderhelm in 1914 upon the alleged capacity of oestrin to produce equine infectious anaemia, a contention subsequently refuted by Van Es & Schalk, de Kock, and Du Toit.

The author concludes that the larvae of *Gastrophilus* have no causal connection with the disease, and that the larvae or their extracts, in cases where they have been claimed to produce this disease, in reality set up an anaphylactic reaction.

CHRÈTIEN (A.). **L'Onchocercose du Boeuf à Madagascar.**—*Bull. Soc. Cent. Méd. Vét.,* 20th May 1920; *Rec. Méd. Vét.,* xcvi, 30th April–30th May 1920, nos. 8 and 10, pp. 168–172. (Abstract in *Trop. Vet. Bull., London,* viii, no. 3, 30th September 1920, pp. 213–215.)

Among the parasites of the cattle in Madagascar is a Nematode that is often present in abundance and was found in almost all the animals that came under observation of the author. He does not believe it to be identical with *Onchocerca bovis,* and its presence does not appear to produce any symptoms in the living animal.

von Bassewitz (E.). **A Sanguesuga "*Haementeria offic.*" Transmissora da Pyroplasmose equina sul-americana "Mal de Cadeiras."** [The Medicinal Leech as Transmitter of South American Equine Trypanosomiasis, Mal de Caderas.]—*Brazil-Medico, Rio de Janeiro,* xxxiv, no 18, 1st May 1920, pp. 283–285.

In view of the author's statement as to the transmission of Mal de Caderas by leeches [*R.A.E.*, B, viii, 102], further details are given. Subsequent to the application of common medicinal leeches (*Haementeria officinalis*) to a foal, the animal became affected with an intermittent type of fever that developed into a typical case of Mal de Caderas, the trypanosome of which was found in its blood.

The author has previously observed that infected horses could safely be allowed to run with healthy ones even though blood-sucking insects were present in numbers.

Gill (C. A.) & Harnam Singh (B.). **Report on the Malaria in Thanesar Town.**—*Lahore,* Supt. Govt. Printing, Punjab, 1920, v + 16 pp., 2 maps. [Not for sale.]

Thanesar is a partly ruined town situated on mounds produced by huge surrounding excavations, and is extremely unhealthy owing to a high degree of endemic malaria. A chain of tanks and ponds almost completely encircles it, and in these, as well as in the swamps and drains surrounding them and in the pools among the ruins, Anopheline larvae breed in large numbers. The ruined buildings and the abundant vegetation in and around the town provide a suitable environment for the adults. Mosquitos are exceptionally prevalent, and even half a mile from the town, malaria-carrying species can be readily captured even as late in the year as December.

During the winter months, and in the most suitable situations, *Anopheles fuliginosus* and *A. subpictus* (*rossi*) were captured in small numbers. In October the conditions were entirely different, and *A. culicifacies* and *A. subpictus* were present in large numbers throughout the area. *A. fuliginosus* and *A. fowleri* were also abundant, especially in stables and cowsheds, whilst a few examples of *A. hyrcanus* (*sinensis*), *A. stephensi* and *A. barbirostris* were captured. In March, *A. fuliginosus* was the only adult taken, except for a single specimen of *A. hyrcanus*.

A list of the breeding-places is given, together with the species of larvae found.

The removal of the town to a more salubrious neighbourhood three or four miles distant is the proposed solution for the elimination of malaria.

Darling (S. T.). **Experimental Inoculation of Malaria by means of** *Anopheles ludlowi.*—*Jl. Experim. Med., Baltimore, Md.,* xxxii, no. 3, 1st September 1920, pp. 313–329, 3 charts. (Abstract in *Trop. Dis. Bull., London,* xvii, no. 2, 14th February 1921, pp. 144–145.)

Experiments showing *Anopheles ludlowi* to be a carrier of malaria are described.

In a village on the north shore of Java the splenic index was 97 and the parasitic index 29 per cent. The mosquitos were chiefly *A. ludlowi*, and 6 out of 58 of them contained malarial zygotes. From larvae from fish reservoirs only *A. ludlowi* emerged, while of 121 captured examples of *A. subpictus* (*rossi*) all proved free from infection.

Of 40 *A. ludlowi* reared from larvae and fed on suitable carriers, 52 per cent. became infected. Six *A. ludlowi* similarly fed were, after the appropriate interval, again fed, on three uninfected persons. All of these developed malaria in from 14 to 18 days.

Emphasis is laid on the importance of ascertaining whether an Anopheline that feeds on man restricts itself to that host or is attracted to others, such as *A. umbrosus* and *A. tessellatus*, which also feed on fowls; *A. umbrosus*, *A. subpictus* and *A. indefinitus*, which also feed on cattle; and *A. albimanus*, which specially attacks horses. A species that only attacks man will be correspondingly dangerous in disseminating human malaria, since the parasites it carries will not be lost in other hosts.

GEIGER (J. C.) & PURDY (W. C.). **The Malaria Problem of the Rice Field of the United States.**—*Southern Med. Jl., Birmingham, Ala.*, xiii, no. 8, August 1920, pp. 577–584. (Abstract in *Trop. Dis. Bull., London*, xvii, no 2, 14th February 1921, p. 133.)

The information given here has already been noticed from other sources [*R.A.E.*, B, vii, 74; viii, 63, 64].

SÉGUY (E.). **Les Moustiques de France.**—*Bull. Mus. National Hist. Nat., Paris*, 1920, nos. 3, 4, 5 and 6, pp. 223–230, 322–329, 407–414 and 512–519, 19 figs.

These papers are continuations of those already noticed [*R.A.E.*, B, viii, 224], and include keys to the species of *Ochlerotatus* and *Theobaldia*, with a description of *Ochlerotatus lesnei*, sp. n.

RIZZI (M.). **Nuovo Indirizzo di Profilassi antimalarica.** [A new Form of Anti-malaria Prophylaxis.]—*Ann. d'Igiene, Rome*, xxix, no. 11, 30th November 1919, pp. 748–751.

Referring to Roubaud's suggestion that animal quarters should be used to protect human dwellings from malaria [*R. A.E.*, B, viii, 141], the author claims that this point was first recognised and applied at Trinitapoli, Italy. The following experiences at and around that place show the conditions under which this method affords protection.

In a locality that was usually non-malarious, numerous Anophelines were found in one stable, which had proved useful in concentrating them in a house inhabited by one person, thus freeing the surrounding zone containing many inhabitants. In one village in a malarious locality Anophelines were only found in small numbers and in a few outlying houses, but at two points, half a kilometre away, two large cow and sheep shelters contained many individuals.

A third instance is that of Trinitapoli itself, a town that frequently suffers from malaria. It was not possible to free all the large ponds in the vicinity from Anophelines. The mosquitos steadily increased in stables, etc., but at first only in the direction of the ponds. An increase of their numbers in the stables was, however, followed by their appearance in the nearest town dwelling; but by supplementing the protection afforded by the stables, by artificial anti-mosquito measures, the town was kept free from fresh infections and from mosquitos.

Reliance on the vicinity of stables, etc., is therefore not sufficient in itself and may, indeed, prove definitely harmful.

The Poultry Tick.—*Jl. Dept. Agric. S. Australia, Adelaide,* xxiv, no. 9, April 1921, pp. 756–757.

The importance of precautions against the poultry tick, *Argas persicus,* is emphasised. Not only do the mature ticks migrate from place to place by night, but during hot days the larvae emerge from their haunts in cracks, etc., and spread the spirochaetal infection, which they are as capable of doing as the adults. All tick-infested premises, carts, crates, etc., should be thoroughly treated with pure kerosene or with a boiling emulsion of 10 to 20 per cent. kerosene, all cracks and crevices being flooded and woodwork saturated. Spraying is considered useless.

Sanderson (E. D.) & Peairs (L. M.). **Insect Pests of Farm, Garden and Orchard.**—*New York,* John Wiley & Sons, Inc. ; and *London,* Chapman & Hall, Ltd., 1921, 2nd edn., vi + 707 pp., 604 figs. Price 26*s*.

The present volume is the result of the junior author's revision of the original work by Sanderson, and collates the results, more especially those relating to methods of control, yielded by entomological investigation since the work was first issued in 1912. The main additions are three chapters dealing with the insects directly attacking man and domestic animals, and with those injurious to citrus fruits.

The discussions of life-histories, habits, and control are based upon conditions east of the Rocky Mountains, practically no consideration being given to the conditions of the Pacific Coast or to those of the irrigated country of the Far West. The illustrations adequately meet the needs of such a work of general reference, and the volume must rank as one of the standard works on applied entomology.

Webber (H. J.). **Malaria-Mosquito Survey.**—*Ann. Rept. 1919–20, California Univ. Agric. Expt. Sta., Berkeley,* 1920, pp. 60–61.

A malaria-mosquito survey has been carried out in every county in California. Endemic malaria was found at 5,482 feet, and three-fifths of all the cases of malaria in the State occur in an area of 20,000 square miles. All major and minor foci have been located. Successful measures were adopted in southern Shasti County, where 72 per cent. of the people suffered from malaria, 25·2 per cent. showing positive blood smears in the spring. In October 1919, the results of the measures adopted were apparent, as only 12 per cent. showed positive blood smears, while in March 1920 there were none. Owing to the presence of malaria no property had been sold to new settlers, but early in 1920 five times as much property changed hands as had been recorded during the preceding three years.

Dollfus (R. P.). **Une Espèce de Moustique nouvelle pour la Faune Française,** *Aëdes* (*Ochlerotatus*) *zammitti,* **Theobald**—*C. R. Soc. Biol., Paris,* lxxxiv, no. 19, 28th May 1921, pp. 971–972.

Aëdes (*Ochlerotatus*) *zammitti,* Theo., is recorded from France, apparently for the first time.

Carter (H. F.). **A Revision of the Genus** *Leptoconops,* **Skuse.**—*Bull. Ent. Res., London,* xii, pt. 1, June 1921, pp. 1–28, 10 figs.

The following new species of the genus *Leptoconops* are described :—*L. longicornis* and *L. grandis* from Western Australia, *L. rhodesiensis* from North-Western Rhodesia, and *L. siamensis* from Siam. *L. kertezi,* Keiff. var. *americanus,* n., is described from Utah.

A new genus, *Acanthoconops,* is erected and contains two species, *A. spinosifrons,* sp. n., and *A. albiventris,* de Meij., of which the former is the genotype.

Balfour (A.). **Mosquito Breeding in Saline Waters.**—*Bull. Ent. Res., London,* xii, pt. 1, June 1921, pp. 29–34.

The subject of mosquitos breeding in salt or brackish waters is of practical importance in anti-malaria work, for it has often been suggested that ordinary mosquito breeding-places might be abolished by the introduction of salt or sea water, and in some cases this procedure has actually been carried into effect. In the case of certain species of mosquito, however, it is useless or worse than useless.

Moreover, information on the efficiency of larvicides in saline waters is still defective.

In view of this, a number of annotated references on this subject are given, supplementary to those furnished by Dr. Dalziel [*R. A.E.*, B, ix, 41] and dealing almost entirely with mosquitos known to be vectors of disease.

Hill (G. F.). **The Bionomics of *Tabanus aprepes,* and other Australian Tabanidae.**—*Bull. Ent. Res., London,* xii, pt. 1, June 1921, pp. 41–62, 2 plates, 21 figs.

The life-history, habits and developmental stages of *Tabanus aprepes,* Tayl., and *T. rufinotatus,* Big., are described at length, and similar details, so far as they are known, are given rather more briefly concerning *T. nigritarsis,* Tayl., and *Silvius notatus,* Ric.

Edwards (F. W.). **Mosquito Notes. II.**—*Bull. Ent. Res., London,* xii, pt. 1, June 1921, pp. 69–80.

The new species described are:—*Anopheles flaviceps,* from the Anglo-Egyptian Sudan; *A. amictus,* from Queensland; *Megarhinus* (*Toxorhynchites*) *kempi,* and *M.* (*T.*) *gravelyi,* from India; *M.* (*T.*) *klossi,* from the Malay States; *Aëdes* (*Stegomyia*) *dendrophila,* from the Gold Coast; *A.* (*Ochlerotatus*) *ashworthi,* from West Australia; *A.* (*Skusea*) *punctipes,* from Upper Burma; *Rachionotomyia aenea,* from the Malay States; and *R. purpurata,* from Fiji.

The suggestion that *Anopheles immaculatus,* Theo., may be an albinoid form of *A. vagus,* Dön., is supported by the fact that an examination of the male hypopygia has revealed no tangible difference between the two forms. Besides the typical form of *A. leucosphyrus,* Dön., another well-marked form, *A. leucosphyrus* var. *hackeri,* occurs. They are probably, however, not specifically distinct.

The author does not agree with Swellengrebel [*R. A.E.*, B, viii, 136] in attributing *Anopheles* (*Nyssorhynchus*) *annulipes* var. *moluccensis* to that species, and considers that it is really a variety of *A. punctulatus,* Dön. He follows him, however, in treating *A. tessellatus,* Theo., as a variety only of *A. punctulatus.*

Opifex fuscus, Hutton, originally described from New Zealand as a Tipulid, is actually a Culicine mosquito. It is difficult to place it precisely in relation to the other genera; it seems nearer to *Aëdes* than to *Culex.*

Both sexes, apparently of *Aëdes* (*Skusea*) *funerea,* Theo., have been received from Amboina. Another pair from Ceram are regarded as *A. funerea* var. *ornata,* Theo. *Lepidomyia lineata,* Tayl., is regarded as a synonym of this variety.

The following new names are proposed :—*Culex crinicauda* for *C. parvus*, Tayl., nec Macq. (this species is not synonymous with *C. vishnui*, Theo.) ; *C. taylori* for *Leucomyia annulirostris*, Tayl., nec *Culex annulirostris*, Skuse ; and *C. basicinctus* for *Leucomyia annulata*, Tayl., nec *Culex annulatus*, Schrank.

Further examination shows *Culex albigenu*, End., to be synonymous with *C. ventrilloni*, Edw. ; *C. auritaenia*, End., with *C. quasigelidus*, Theo. ; *Lophoceratomyia curtipalpis*, Edw., with *Culex* (*L.*) *jenseni*, Meij. ; and *Rachisoura sylvestris*, Theo., and *Mimeteomyia hilli*, Tayl., with *Rachisoura filipes*, Wlk. ; while *Stegomyia quasiornata*, Tayl., should be placed in the genus *Rachionotomyia*.

LAMBORN (W. A.). **The Nature and Function of the Caudal Tufts of Malayan Anopheline Larvae.**—*Bull. Ent. Res., London*, xii, pt. 1, pp. 91–97, 3 figs.

The larvae of certain Anophelines, particularly *A. maculatus*, *A. karwari* and *A. aitkeni*, occur in streams so swift that their presence would appear impossible without some mechanism that enables them to maintain their position in the water. A pair of dorsal tail brushes, terminated by hooklets, provides this mechanism ; and there is a counterpart, in the case of certain pupae, in the form of a pair of hooks terminating the paddles.

DUKE (H. L.). **Annual Report of the Uganda Protectorate Bacteriological Department for Year ended 31st December 1920,** *Entebbe*, 1921, 20 pp.

Malaria is very common among the monkeys in the Uganda laboratory, the parasites resembling the benign tertian type. A natural infection of a *Plasmodium* in a chimpanzee is interesting in view of the recent experiments of Mesnil and Roubaud [*R. A. E.*, B, viii, 217].

Experiments are in progress dealing with the affinities of the lake-shore trypanosomes and their development in *Glossina palpalis*. Feeding of 3,029 wild flies from around Entebbe on four monkeys resulted in one of the latter developing the lake-shore trypanosome.

Four cases of sleeping sickness were reported from a village on the northern shore of Lake Kwania, and in consequence a tour of the district was undertaken, in the course of which 3,258 natives were examined without any case of the disease being detected. A few individuals of *G. palpalis* were obtained along the Kwania shores, and it is considered that the sporadic cases of trypanosomiasis in that region are due to their agency. There is no evidence that any tsetse other than *G. palpalis* is the vector of human trypanosomiasis in Uganda ; actual experimental examination of the trypanosomes carried by the inland bush flies could not, however, be made. Clearing should reduce the already small danger of human infection, and the conditions are not such as to justify the fear of an epidemic.

Sleeping Sickness.—*Tanganyika Territory : Ann. Repts. Principal Med. Officer and Senior San. Officer*, November 1918 to November 1920, pp. 15–18. [Received 14th June 1921.]

A review is given of the conditions with regard to sleeping sickness and the occurrence of *Glossina* in Tanganyika territory according to German records. The present position is not very clear, indicating the need for organised investigations. The existing restrictions and precautionary measures adopted by the Germans are being carried out as far as possible. So far no case of human trypanosomiasis of either form has been found by the civil staff.

ROSE (F. G.). **Report of the Government Bacteriologist, British Guiana, to the Tropical Diseases Research Fund Committee for the period January 1919 to March 1920.**—*Proc. R. Soc. Med., Sect. Trop. Dis. & Parasit., London,* xiv, pt. 8, June 1921, pp. 1–17.

This report includes the results of investigations to determine the usual mosquito carriers of *Filaria bancrofti* in Georgetown. Some 1,500 female mosquitos were dissected, of which 237 were *Stegomyia fasciata,* 105 *Anopheles* (*Cellia*) *argyritarsis,* 27 *Taeniorhynchus* (*Mansonia*) *titillans,* and 1,131 *Culex fatigans.* The latter is apparently the only carrier of *Filaria bancrofti* of any practical importance in Georgetown. Approximately 7·4 per cent. of this species were found to be infected with the organism, which was not found in any of the other mosquitos.

LANZENBERG (A.). **Un Cas de Paludisme autochtone à** *Plasmodium praecox.*—*Bull. Soc. Path. Exot., Paris,* xiv, no. 5, 11th May 1921, pp. 266–268.

Before the war the cases of malaria in France in the endemic centres, or the few isolated cases occurring near patients from abroad, were all due to *Plasmodium vivax,* the agent of benign tertian, and it seemed that indigenous Anophelines were incapable of developing or transmitting *P. malariae* or *P. praecox* (*falciparum*).

The large influx of malaria carriers from abroad has, however, led to numerous cases in France, and a few of these are due to *P. praecox.*

KEUKENSCHRIJVER (N. C.). **Eenige Waarnemingen over Malaria bij de Hollandsch-Amerikaansche Plantage Mij. te Kisaran.** [Some Observations on Malaria at the Dutch-American Plantation Company's Estates at Kisaran.]—*Geneesk. Tijdschr. Ned.-Indië, Batavia,* lxi, no. 2, 1921, pp. 202–210, 2 plates.

Kisarang is situated about 12 miles from the coast of Sumatra at an altitude of about 60 ft. The soil, consisting chiefly of clay and sand, is very impermeable. Malaria is due to the resulting bad drainage and to the river beds being too high as compared with the land around them.

The following Anophelines occur in the virgin forests :—*Anopheles barbirostris, A. umbrosus, A. hyrcanus* (*sinensis*) and *A. leucosphyrus.*

In the rubber plantations the species found are *A. barbirostris* (very few), *A. umbrosus* (few), *A. novumbrosus* (*similis,* Strickl.) (sporadic), *A. albotaeniatus* (few), *A. kochi* (numerous), *A. indefinitus* (formerly abundant, now sporadic), *A. punctulatus* (sporadic), *A. fuliginosus* (a few specimens), *A. leucosphyrus* (a few specimens), and *A. hyrcanus* (formerly few, now more numerous).

In buffalo-sheds the percentages of *Anopheles* to *Culex* were from 2 to 5 per cent. ; sometimes, however, 30 per cent. of *A. indefinitus* were present. None of the Anophelines captured in the buffalo-sheds were infected, but one specimen of *A. kochi,* taken indoors, was.

The larvae of *A. kochi*, *A. indefinitus* and *A. hyrcanus* are easy to find in drains and wet places near trees, but those of *A. umbrosus* and *A. albotaeniatus* have not been seen ; they probably live in the damp earth and in the dead leaves lying beneath trees.

A. indefinitus was easily experimentally infected to the extent of 10 per cent. with benign tertian and malignant tertian malaria, and *A. kochi* to the extent of 5–10 per cent. *A. umbrosus, A. albotaeniatus, A. barbirostris* and *A. novumbrosus* remained uninfected. In the case of the remaining species the number of specimens was too small to permit of a proper test. *A. kochi* may therefore be said to play an important rôle in the spread of malaria.

The spleen indices varied from 50 to 25 per cent. The parasite indices varied from 15 to 5 per cent. ; formerly—in 1919—they sometimes reached 50 per cent. Two-thirds of the infection is malignant tertian and one-third benign.

Better nourishment and not too hard work for the coolies and the reduction of breeding-places by better drainage and extensive oiling should diminish the chances of infection to a point where the administration of quinine will give better results.

da Costa Lima (A.). **Contribuição para o Conhecimento dos Insectos da Familia Polyctenidae (Hemiptera).** [A Contribution to the Knowledge of the Insects of the Family Polyctenidae.]—*Arch. Escola Sup. Agric. e Med. Vet., Nictheroy (Rio de Janeiro)*, iv, no. 2, December 1920, pp. 61–76, 1 plate. [Received 14th June 1921.]

This sytematic paper contains a list of the species of the Polyctenidae with a key to the genera of these parasitic Rhynchota.

Paisseau (G.) & Loubrieu (—). **Paludisme autochtone à** *Plasmodium praecox.*—*Bull. Soc. Path. Exot., Paris*, xiv, no 5, 11th May 1921, pp. 268–273.

A case of indigenous infection with *P. praecox* is described and discussed in conjunction with the 12 other cases observed in France since 1917.

Of the 13 cases 6 were syphilitic, leading to the assumption that the predisposing rôle ascribed to parasitic diseases, such as dysentery, may be extended, especially in a temperate climate like that of France, to syphilis.

The abnormal climatic conditions do not appear to modify either the virulence of the parasite or the gravity of the affection caused by it.

There appears to be a possibility that the indigenous cases of *P. praecox* do not follow the rule that infections with this parasite change with age into infections with *P. vivax*. Further investigation is, however, needed to investigate this point.

Referring to the above observations, M. Roubaud mentioned two further cases showing the persistence of the infection with *P. praecox* during several years. One of them had syphilitic antecedents.

Laveran (A.) & Franchini (G.). **Sur un** *Herpetomonas* **du Loir.**—*Bull. Soc. Path. Exot., Paris*, xiv, no. 5, 11th May 1921, pp. 278–280, 1 fig.

A new Herpetomonad, and for which the name *Herpetomonas myoxi*, is proposed, is recorded from the blood of the dormouse (*Myoxus glis*) at Bologna.

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SELLA (M.). **The Antimalarial Campaign at Fiumicino (Rome), with Epidemiological and Biological Notes.**—*Internat. Jl. Public Health, Geneva*, i, no. 3, November 1920, pp. 316–346, 7 figs. [Received 21st June 1921.]

This paper gives a brief outline of the results obtained during the antimalaria campaign at Fiumicino [*R.A.E.*, B, viii, 221].

STRONG (R. P.). **The Anti-Typhus Campaign in 1915 in Serbia considered in connexion with the present Typhus Epidemic in Poland.**—*Internat. Jl. Pub. Health, Geneva*, i, nos. 1 and 2, July and September 1920, pp. 7–33 and 188–210. [Received 21st June 1921.]

An account is given of the condition of Serbia during the typhus epidemic of 1915, and of the work of the Commission sent out to deal with it. Owing to the large number of doctors who contracted the disease, in spite of every precaution against lice, it is concluded that there is in all probability some other method of infection, and that while lice are undoubtedly the main vectors and the cause of epidemics, it is possible that infection may be conveyed by the droplet method of infection after coughing.

As a result of Polish appeals to the nations for assistance in dealing with the disease, a fully equipped Commission has been sent out, and the Polish Government is expected to support and assist the campaign. The plan includes a comprehensive scheme for dealing with Central Poland, as the disease is established throughout Polish territory and is spreading from foci in the interior.

The essentials for combating the disease on a large scale are the establishment of sanitary cordons, hospitals and delousing stations, the provision of food and fuel, and expert direction of the work. The campaign has not, however, up to the present time, been prosecuted by the Polish Government in a sufficiently energetic and satisfactory manner. In Serbia the disease was so general that practically every family in the country had suffered from it, and the mortality was about 50 per cent., but in Poland the mortality has seldom as yet been above 9 per cent., and the people as a whole are not willing to submit to the inconveniences of delousing measures. Every effort is being made to arouse and stimulate the interest of the people in eradication measures. The danger of the disease spreading to western Europe is great, and it is pointed out that it is at present costing the world more to tolerate typhus than to eliminate it.

WOLBACH (S. B.), TODD (J. L.) & PALFREY (F. W.). **Notes on Typhus. (Being a Preliminary Report from the Typhus Research Commission of the League of Red Cross Societies to Poland.)**—*Internat. Jl. Pub. Health, Geneva*, i, no. 2, September 1920, pp. 211–215. [Received 21st June 1921.]

Experiments undertaken in the course of anti-typhus work in Poland showed that in lice fed upon typhus patients under favourable conditions, a peculiar pleomorphic micro-organism is constantly present, and is identical with that named *Rickettsia prowazeki* by da Rocha Lima [*R.A.E.*, B, v, 110; vi, 58]. In the vascular lesions of experimental animals infected with typhus, a minute micro-organism has been demonstrated, which in morphology and staining reactions is consistent with this organism in at least two of the forms in which it is seen constantly in lice.

(4057) Wt. P.3/184 9/21 Harrow

Griffitts (T. H. D.). *Anopheles* **and Sea Water, with Observations on the Influence of Salinity on the Development of American Species.**—*Public Health Repts., Washington,* xxxvi, no. 18, 6th May 1921, pp. 990–1000.

The observations of various authors on mosquitos thriving in sea-water are quoted, and the author's notes on *Anopheles quadrimaculatus*, *A. crucians* and *A. punctipennis* are given. It was found that *A. crucians* can breed in diluted sea-water with a maximums alinity of 10,088, or slightly more than 50 per cent. average sea-water. *A. quadrimaculatus* may possibly withstand a higher salinity intermittently, but was not found to breed in sufficient numbers to be of sanitary importance in a higher salinity than 10,003, or 1·5 per cent. sea-water. Individuals transferred from fresh pond water to water with a salinity of 10,160 were all killed within 12 hours. Although *A. punctipennis* breeds under a wider range of conditions than either of the other two species, it apparently does not survive in salt or brackish water, and larvae placed in sea-water all died within seven hours.

Theiler (Sir A.). **African Horse Sickness** (*Pestis equorum*).—*Union S. Africa Dept. Agric., Pretoria,* Sci. Bull. 19, 1921, 32 pp. [Received 21st June 1921.]

Horse-sickness is a disease of equines caused by an ultra-visible virus which is probably transmitted by a blood-sucking insect. It is noticeable that this disease of horses frequently appears simultaneously with malarial fever in man, especially in the low-lying regions of the Transvaal and Natal. The area of distribution of the disease, however, is not the same, horse-sickness occurring over a much wider area and at much higher altitudes. Evidence definitely points to insect transmission ; this is particularly demonstrated in the safety of horses stabled in insect-proof premises. No proof has, however, as yet been brought forward as to the identity of the insect that is the actual carrier; Anophelines cannot be implicated for the reason indicated. Enzootic outbreaks appear suddenly after heavy, prolonged rain, and many deaths occur within a short time. The disease may appear in farms or other places that are not well supplied with running or even standing water, and cannot therefore be regarded as providing permanent breeding-places for mosquitos. The transmitting insect must therefore be one that does not require running water for its evolution and of which the cycle is rapid, for the adults must appear very soon after the rains. In fact, evidence shows that the insect must be able in one stage of its development to maintain life without water. Observations over a number of years point to the possibility of some species of Culicine, such as *Ochlerotatus,* being the vector. The larvae of these mosquitos are found in hoof-holes, and the eggs can remain alive in moist earth for a considerable time, while the life-cycle is completed in a week. The circumstances suggest that the adults emerge infected, the infection having passed from adult to egg and having survived through the subsequent stages. The question of where the transmitting insects obtain the original infection has not been definitely settled. The blood of a sick animal is infective and remains so until some time after recovery, in some cases the blood of a recovered horse when infused in large quantities into susceptible horses can produce the disease. In one instance the blood of such a recovered horse was still infective 90 days after injection of the virus. It is possible that donkeys, dogs and goats may prove to be susceptible. The fact that horse-sickness appears in parts of Africa where there have been no equines points definitely to a non-equine as the reservoir.

Wardle (R. A.). **The Protection of Meat Commodities against Blowflies.**—*Ann. App. Biol., Cambridge*, viii, no. 1, June 1921, pp. 1–9.

Substances containing animal proteins, especially albumins and globulins, are preferred by blowflies for oviposition, but albuminoid substances are not attractive. As the stimulus to oviposition, whether olfactory or gustatory, apparently lies in the exuding juices such as blood and muscle plasma, the protein content, to be suitable, must not have been coagulated by heat or washed out by water or salt solution. Further experiments may indicate that amino-acids contain the stimulus to oviposition, and that in *Calliphora* this is chiefly gustatory, whilst in *Sarcophaga* it is olfactory. This would account for the difference in response to skatol. There is a great difference in response to light between species of *Calliphora* and *Lucilia*. This would also account for the predominance of *C. vomitoria* in houses and like situations, where the odours from dark places may attract it more readily. *Lucilia caesar*, on the other hand, is very strongly phototactic. Both species are apparently equally chemotactic. *Lucilia* presumably prefers carrion in bulk, and is primarily a fly infesting carcases in the open ; it thus does not have the economic significance of *Calliphora* as regards foodstuffs.

Repellent substances may be divided into those directly applicable to foodstuffs and those indirectly applicable. Of the former, precipitated chalk will protect fresh meat as long as it remains unsaturated by exuding juices of muscle plasma or putrefaction. Of the various substances applied indirectly, aniseed oil proved most effective. A cotton net with a quarter inch mesh was impregnated with the oil by moistening the palms of the hands and rolling the net between them. This method protected the meat for 24 hours. The efficiency of emulsions and dilutions of the oil vary directly in proportion to the percentage of oil present.

The Malarial Danger.—*Med. Jl. Australia, Sydney*, 8th Year, i, no. 19, 7th May 1921, pp. 385–386.

Several cases of indigenous malaria have recently been recorded from Australia. The need for preventing its spread by controlling the intermediary hosts is emphasised.

Anopheles (*Nyssorhynchus*) *annulipes* is apparently the mosquito chiefly concerned in the transmission of the disease.

Dodd (S.). **Tick Paralysis.**—*Agric. Gaz. N.S.W., Sydney*, xxxii, nos. 4 and 5, April and May 1921, pp. 265–272, 331–337.

On the eastern coast of Australia a paralysis that is most common in domesticated animals, and is occasionally reported in human beings, is well known, and has been ascribed to a tick. The disease generally occurs in spring and summer, *i.e.*, when ticks are most prevalent in the bush. In the more northern parts of Australia, where the winters are seldom cold enough to arrest the life-cycle of ticks in general, it may occur at any period of the year. In susceptible individuals one tick is quite sufficient to cause grave symptoms and even death. The younger the animal, the less favourable the prognosis. Most of the cases of tick paralysis in adult cattle, horses and dogs narrated to the author were seen where the animal had been heavily infested with ticks. Animals indigenous to the country appear to be naturally immune, but this fact is not definitely established. Recovery from an attack results in a lasting immunity.

The symptoms are described and historical notes are given on the disease in Australia, the first record being by Bancroft in 1884.

Experiments with guinea-pigs and dogs confirm the fact that one species of tick can produce a very fatal affection in animals, the main feature of which is a progressive motor paralysis. This tick has been definitely identified as *Ixodes holocyclus*. There is a period of 5–6 days between the attachment of the tick and the appearance of symptoms.

The question as to whether the condition is due to a living organism or to a toxin is not a simple one. The fact that no paralysis results if ticks be removed before symptoms set in, although they may have been attached for a day or two, can be used as an argument in favour of both hypotheses.

BAGNÉ (J.). **Annual Report of the Veterinary Inspector.**—*Ann. Rept. Porto Rico Insular Expt. Sta., 1919–20, Rio Piedras,* 1920, pp. 95–101. [Received 21st June 1921.]

Previous work in connection with cattle tick eradication in Porto Rico has not been very successful. As a result of the action of the Legislature in allocating for this purpose about £3,000 to the Insular Experiment Station, a campaign against ticks has been undertaken. The work was begun in July 1919, when 22 dipping vats were in use on the Island. After seven months the work was turned over to the Bureau of Agriculture, the number of vats having been increased to 43 and 17,409 animals having been dipped.

AUSTEN (E. E.). **The Prey of the Yellow Dung-fly,** *Scatophaga stercoraria,* **L.**—*Ann. Mag. Nat. Hist., London,* viii, no. 43, July 1921, pp. 118–123.

With reference to the statement that *Scatophaga stercoraria,* L., preys on *Calliphora* [*R. A. E.*, B, ix, 57], doubt is expressed as to whether this species is really of any importance in the natural control of blow-flies. Statements by numerous authors regarding the prey of *S. stercoraria* are quoted, showing that the normal food consists of much smaller flies. The occasional attacks on *Calliphora* by this fly are considered accidental and probably due to abnormal conditions.

SENEVET (G.). **A propos de la Reproduction chez** *Hyalomma aegyptium,* **L.**—*Bull. Soc. Hist. Nat. Afr. Nord, Algiers,* xii, no. 5, 15th May 1921, pp. 104–105.

In the case of *Hyalomma aegyptium,* L., Lounsbury recorded a preoviposition period of 14 days in February in the southern hemisphere, and Nuttall has given an average of 6–12 days at a temperature of 15°–19° C. (59°–68° F.), but he notes a case in which oviposition began only 49 days after the tick had been separated from its host. The author records here a series of seven ticks, the preoviposition periods of which are even longer, the number of days being 4, 125, 149, 150, 153, 157, and 157. The eggs from these retarded ovipositions seem as numerous as in normal cases. The third tick in the above series laid 8,307 eggs, a figure inferior to the average of 10,000–15,000 given by Nuttall, but larger than that of 4,300 found by that worker for ticks from Algeria. The series was kept at a temperature of 19°–25° C. (59°–77° F.), so that lack of warmth is no reason for the delay. Nor can lack of food be adduced.

In any case all measures directed towards the destruction of *H. aegyptium* must have regard to the possibility of a long preoviposition period. Pasture rotation, already of doubtful efficacy owing to the long resistance offered by the larvae to starvation, is now faced with this fresh difficulty.

HEARLE (E.). **The Mosquito-control Act of British Columbia.**—*Agric. Jl., Victoria, B.C.*, vi, no. 4, June 1921, p. 98.

This Act, passed in 1919, has just been repealed as a result of data collected by the author, who was the Federal Officer studying mosquitos in the Fraser Valley. The Act authorised the formation of localised mosquito-control districts with funds derived from a municipal tax on real property, and such legislation would be admirably suited to cope with certain mosquitos where the trouble was caused by general breeders with a small range of flight. In the Fraser Valley, out of a mosquito fauna of over twenty species, only two are of economic importance, and these only occurred in great numbers when the river freshets exceeded certain levels.

Little real progress in controlling these mosquitos can be expected until the larger areas subject to flooding have been reclaimed. Once the reclamation of these is completed, it will be feasible to deal with the smaller ones by artificial methods. There is little hope of much being accomplished until the municipalities and other bodies in the affected region co-operate and vest their authority in a central mosquito-control commission.

WEBB (J. L.). **Arsenical Poisoning of Stock.**—*Jl. Dept. Agric. Union S. Africa, Pretoria*, ii, no. 6, June 1921, pp. 557–561.

Dipping in arsenical fluids has entailed an occasional loss of farm stock from poisoning, which is avoidable in many cases. The most common causes are: dipping solution made too strong; dipping on misty or wet days, or through such weather coming on after animals have been dipped; working cattle during the heat of the day that are being regularly dipped in full strength solution every five or seven days and continuing to work them after they show signs of distress; leaving dips exposed to the access of stock; drinking dip during the process of dipping; too frequent dipping or spraying; and the malicious poisoning of cattle with arsenic. These points are discussed and the symptoms of arsenical poisoning and post-mortem appearances are described.

The best chemical antidote is ferric hydrate. This may be prepared by diluting 3 oz. of tincture of iron perchloride with 4 oz. water; dissolve 1 oz. sodium carbonate (washing soda) in $\frac{1}{2}$ pint of water; mix the two solutions and administer. These quantities will render insoluble 10 grains of arsenic. Three doses at least should be given, repeated at intervals of a quarter of an hour. The above doses are for horses or cattle. To be of any use the antidote must be administered within a very short time of the poison being taken, and in animals the diagnosis can rarely be made soon enough to give the antidote a chance. If the chemical antidote is not at hand, or if several hours have elapsed, demulcent drinks, such as well-boiled flour or oatmeal gruel thinned with plenty of fresh milk, together with a sedative, such as tincture of opium or chlorodyne, may be tried. For adult horses and cattle the dose of these drugs is 1–2 oz. according to size, repeated every six hours whilst the pain and diarrhoea continue. The subcutaneous injection of 4-grain doses of morphia in the first stages retards absorption of the arsenic, and in later stages relieves the pain and inflammation. Purgatives are contra-indicated.

Carron oil, made by shaking together equal parts of lime-water and linseed oil, will soothe cases of scalding of the skin caused by dips.

HESSE (E.). **Bemerkung zu : E. Engel, Dipteren, die nicht Pupiparen sind, als Vogelparasiten.** [A Note on Engel's Paper, "Non-pupiparous Diptera as Bird-Parasites."]—*Zeitschr. wiss. Insektenbiol., Berlin*, xvi, no. 7–8, 1st June 1921, p. 154.

To the species mentioned in Engel's paper [*R. A.E.*, B, ix, 20] the author adds *Lucilia caesar*, L., of which he found three females ovipositing on a live nestling of *Turdus viscivorus*.

FEDERICI (E.). **Sulla Lotta naturale contro le Larve di** *Anopheles* **per Mezzo degli Insetti acquatici.** [Natural Control of the Larvae of *Anopheles* by means of Aquatic Insects.]—*Rend. R. Accad. Naz. Lincei, Rome*, Classe Sci. fisiche, matemat. e naturali, xxix, nos. 3–6, 7–8, 1920, pp. 170–173, 244–247.

As a result of a study of the natural control of Anopheline larvae by aquatic insects, it is pointed out that the larvae are to a great measure protected by their horizontal position at the surface and close to plants, and that their peculiar life-conditions also tend to assist them. Rhynchota of the genera *Naucoris*, *Notonecta* and *Corisa*, and Odonata of the genera *Aeschna*, *Anax*, *Calopteryx*, *Gomphus*, *Agrion* and *Lestes* do destroy some larvae, but not in sufficient numbers to be of real value.

GRASSI (B.). **L'Anofele può propagare la Malaria anche direttamente ?** [Can *Anopheles* also transmit Malaria directly ?]—*Rend. R. Accad. Naz. Lincei, Rome*, Classe Sci. fisiche, matemat. e naturali, xxx, no. 1, 2nd January 1921, pp. 7–8.

During the summer of 1920 few Anophelines were met with at Fiumicino and intestinal examination of over 200 specimens showed them to be regularly free from malarial parasites. Furthermore, cases of malaria relapse were very rare. There seemed, therefore, a certainty that new infections would not occur. On the contrary, however, several did occur, and some of them under conditions that seem to point to a direct transmission in the sense that an Anopheline that is biting an infected person may, when driven off, bite a healthy individual and infect him by regurgitating the infected blood just obtained. An experiment to test this hypothesis is about to be made.

BORA (E.). **Contributi alla Storia naturale degli Anofeli e alla Lotta biologica contro di essi.** [Contributions to the Natural History of Anophelines and to their Biological Control.]—*Rend. R. Accad. Naz. Lincei, Rome*, Classe Sci. fisiche, matemat. e naturali, xxx, no. 4, 20th February 1921, pp. 122–125.

At Fiumicino experiments, during which a stable was opened and closed at varying times, showed that Anophelines entered chiefly in the early morning, that considerable numbers also enter at sunset, that isolated arrivals occur during the night, and that by day only a few enter, and, as a rule, only if the stable is near to mosquito-infested water. The Anophelines entering during the night are nearly all engorged with blood ; of the others, only a small percentage. Anophelines do not bite for some hours after they enter, appearing to await a favourable opportunity.

A section of canal, about 100 yards long, was found in July 1920 to harbour many larvae of *Anopheles bifurcatus* (*claviger*) and large numbers of a small fish, *Cyprinodon calaritanus.* In the first fortnight of August both fish and larvae disappeared. This does not seem to favour the method of employing fishes to destroy the larvae.

In a section of canal, about 150 yards long, where larvae were abundant, 18 ducks were kept for a month without any visible decrease in the number of larvae. Some hundreds of larvae and *Myriophyllum* grass were placed in a tub surrounded with wire netting, into which two ducks that had been kept without food were admitted. Examination of their stomachs after two hours showed no larvae, but only fragments of *Myriophyllum* and some snails. This appears to show that ducks are of little use in anti-larval work.

MARTINI (E.). **Berechnungen und Beobachtungen zur Epidemiologie und Bekämpfung der Malaria auf Grund von Balkanerfahrungen.** [Calculations and Observations based on Experience gained in the Balkans, relating to the Epidemiology and Control of Malaria].—*Hamburg*, Wissenschaftlicher Verlag, W. Gente, 1921, 107 pp. [Price 15 Marks.]

This study on the epidemiology and control of malaria is based on observations made in 1918 in the Balkans.

Important problems, such as the number of simple and multiple infections to be expected among the cases that occur when a number of troops are billeted in a malarial region, and the effect of quinine on the incidence of malaria, are outlined, and an attempt is made to solve them by means of applied mathematics, the work having been nearly completed when the author became acquainted with Ross's important mathematical study on the epidemiology of malaria.

The author's views on the unicist theory of malaria and the section dealing with Anopheline mosquitos have already been noticed [*R.A.E.*, B, viii, 169 ; ix, 91].

SURCOUF (J. M. R.). **Note synonymique sur la** *Diachlorus maroccanus*, **Bigot (Dipt. Tabanidae).**—*Bull. Soc. Ent. France, Paris*, 1921, no. 9, 11th May 1921, p. 143.

Bigot, in 1892, described *Diachlorus maroccanus* from a male captured at Tangiers. It was thought unlikely that a species of this genus should occur in Morocco, and upon further examination of Bigot's type, it is found that the insect belongs to the subgenus *Mesomyia*, created by Macquart for some species taken out of the genus *Silvius*, Meig. Some further individuals have been captured at Tangiers, and a comparison of these with Meigen's specimens indicate that *D. maroccanus*, Bigot, is the hitherto unknown male of *Chrysops singularis*, Meig. This species has been considered to belong, first to *Chrysops* and then to *Nemorius*, but differs from both and should undoubtedly be placed in the genus *Mesomyia*.

SÉGUY (E.). **Notes synonymiques sur quelques Moustiques paléarctiques.**—*Bull. Soc. Ent. France, Paris*, 1921, no. 10, 25th May 1921, pp. 162–166.

This paper is a collection of references to recent changes in synonymy of Culicines, taken from the work of Lang, Martini, Wesenberg-Lund, and Edwards.

ZOTTA (G.). **Sur la Transmission expérimentale du** *Leptomonas pyrrhocoris*, **Z., chez des Insectes divers.**—*C. R. Soc. Biol., Paris*, lxxxv, no. 23, 25th June 1921, pp. 135–137.

This paper records the results of experiments in the direct inoculation of *Leptomonas pyrrhocoris* into the general cavity of *Galleria mellonella* (caterpillar), *Carausius morosus*, *Calliphora* sp., and *Tenebrio molitor* (larvae), which have no flagellosis of their own, and *Notonecta glauca* and *Naucoris cimicoïdes*, which have a special Leptomonad intestinal parasite.

L. pyrrhocoris, the normal parasite of *Pyrrhocoris apterus*, can be successfully inoculated into *N. glauca*, *N. cimicoïdes*, *G. mellonella* (caterpillar), and *Calliphora* sp. In these the flagellates find an excellent developmental medium and—especially in the larvae of *T. molitor* and *G. mellonella*—multiply greatly after 24–36 hours. After a few passages their virulence is so much increased that a small quantity of infected blood suffices to reproduce the infection. The larvae of *T. molitor*, and particularly those of *G. mellonella*, can resist the infection for a somewhat long period, and by regular passages it is possible to maintain the flagellates indefinitely in these insects. The caterpillar of *G. mellonella* is an excellent laboratory reservoir of the virus.

Infection was not achieved with the adult of *Hydrophilus piceus*, and a Phasmid, *Carausius morosus*, was also refractory, though the resistance of the latter does not seem to be absolute and may break down with a different technique.

In insects liable to infection there occurs an intensive phagocytosis, which is, however, unable to check the course of the infection. In *C. morosus*, in which the infection does not succeed with certainty, progressive degeneration of the flagellates free in the plasma points to a marked humoral reaction side by side with the intense phagocytosis.

The infection is usually fatal in the caterpillar of *G. mellonella*, and though pupation often occurs, the pupae die. In *T. molitor* the infection persists through all stages, and the imagines always harbour Leptomonads in their blood fluid.

In order to speak of a true and definitive adaptation of *L. pyrrhocoris* to the insects mentioned above it is necessary to achieve an infection *per os* as well. A paper on this subject will be published later.

Remy (P.). **De l'Action des Vapeurs de Chloropicrine sur l'***Argas reflexus*, **F.**—*C. R. Hebdom. Acad. Sci., Paris*, clxxii, pt. 25, 20th June 1921, pp. 1619-1621.

All individuals of *Argas reflexus* exposed to chloropicrin gas at the rate of 20g. to 30g. per cubic metre for a day, were killed. This should be repeated at the end of a month to destroy newly emerged individuals.

Villeneuve (J.). **Sur** *Ochrops* (*Atylotus*) *fulvus*, **Meig.**—*Ann. Soc. Ent. Belg., Brussels*, lx, 1920, pp. 65-66. [Received 5th July 1921.]

The genus *Ochrops*, Szilady, includes closely allied species. One of these, *Ochrops fulvus*, Meig., may be divided into two easily differentiated forms. Loew placed *O. fulvus*, Meig., in the group of *Tabanus*, with "eyes thickly covered with hair." This is the second form, for which the name *O. loewianus*, sp. n. (*fulvus* apud Loew, Schiner, Brauer) is suggested here. Other differences between it and *O. fulvus*, Meig., are mentioned. The latter appears to be more a northern species, and *O. loewianus* more a southern one.

Patton (W. S.). **Some Notes on the Arthropods of Medical and Veterinary Importance in Mesopotamia, and on their Relation to Disease. Part iv. Some Mesopotamian Nematocera of Economic Importance. Part v. Some Miscellaneous Arthropods.**—*Ind. Jl. Med. Res., Calcutta*, viii, no. 2, October 1920, pp. 245-256, 1 plate. [Received 6th July 1921.]

Swarms of Ceratopogoninae (biting midges) appear in the early spring when the Euphrates rises in flood and converts the adjacent land into vast, shallow marshes. *Culicoides mesopotamiensis*, sp. n., was extremely abundant along the river banks and creeks during the summer months. It is troublesome to animals, biting horses, mules and cattle. The larvae were numerous in algal matter in pools, streams and creeks. *Leptoconops* (*Tersesthes*) *mesopotamiensis*, sp. n., was present in large numbers during the heat of the day in May, but though it entered the tents and crawled over the occupants, it was not considered to be a blood-sucker. It is possible that it feeds chiefly on animals, and may perhaps in time become a pest of man. The opinions of other authors regarding the possibility of *Culicoides* being a transmitting agent of oriental sore and horse-sickness are discussed. *Phlebotomus papatasii*, Scop., and *P. minutus*, Rond., are both found; the former is the commoner of the two and is one of the most serious insect pests in Mesopotamia. It is extremely abundant, appearing in early March, almost disappearing during the hottest months, and reappearing in large numbers from August to November, when it disappears entirely. *P. minutus* appears a little later in the spring, and is again seen in August and September. Hibernation probably takes place in the larval stage. Both species occur in places where there is no human host, and evidently feed upon some small mammal or reptile, such as desert rats and lizards. The breeding grounds of both species are evidently very wide, breeding occurring in cracks and crevices in the ground in almost any locality. Both species transmit the unknown parasite of sand-fly fever, which is very prevalent in Mesopotamia. The author has recently propounded a new theory regarding the spread of the parasite of oriental sore in Mesopotamia [*R. A. E.*, B, viii, 15]. He does not believe that an intermediate host, such as the gecko, is necessary as a reservoir for the parasite ; the presence of the parasite resembling *Herpetomonas* in the gecko may only be due to that animal eating the flies. The efficient control of these pests on a large scale in Mesopotamia is impossible ; the individual may protect himself from them to a certain extent by the use of such repellents as kerosene oil, vermijelli, eucalyptus oil, anise oil, etc. Spraying cracks and crevices with kerosene emulsion was tried over a small area in a camp, and certainly reduced the number of *Phlebotomus*.

Anopheles pulcherrimus, Theo., is the commonest species of Anopheline in Mesopotamia, abounding in all the marshy areas, particularly along the Euphrates. It was always found to accompany the swarms of midges referred to above, and at once entered the tents, biting in the daylight. It was found breeding on the marsh, in channels, water-cuts and ponds. *A. stephensi*, List., is the most important species, as it is the natural malaria carrier. It is somewhat localised, being commonest in and around Basra, where it breeds in the channels and water-cuts among the date-palms. Its exact distribution requires to be worked out. *A. hyrcanus*, Pall. (*sinensis*, Wied.) is not frequently found ; the author took a few individuals in the marshy areas along the Euphrates. *A. lukisii*, Christ., and *A. maculipennis*, Meig., have also been recorded from Mesopotamia, and *Stegomyia fasciata*, F. (*Aëdes calopus*) was taken in a few localities.

Arthropods, other than Diptera, that were collected and observed and that may be of some economic importance, include the Pulicids, *Pulex irritans*, L., and *Ctenocephalus canis*, Bch. The former abounds in the early spring about the Arab huts and villages. A simple method employed for clearing badly infested premises was to wrap sheets of sticky paper used for catching flies round the bare legs of people walking about the infested houses or areas. The papers were soon covered with fleas, and after renewing them a few times the premises were clean. *C. canis* is frequently found on the dog or cat, but does not apparently become a pest. No case of canine kala-azar was seen or heard of in Mesopotamia. *Cimex hemiptera* does not occur in Mesopotamia, except in Basra and Baghdad, where it has been introduced by Indians. In the purely Arab towns and villages it is unknown. The cases of kala-azar recorded among the inhabitants of lower Mesopotamia were almost undoubtedly contracted in India. *Pediculus humanus* and *P. capitis* are both common pests.

The ticks collected, which probably do not represent anything like the true tick fauna of the country, include the Argasid, *Argas vespertilionis*, Latr., found on tents, furniture and clothes, having probably left its host (a species of pipistrelle) when resting on the tents at night ; and the Ixodids, *Rhipicephalus sanguineus*, Latr., on pariah dogs ; *Boophilus annulatus*, Say, on cattle and buffaloes ; *Hyalomma aegyptium*, L., chiefly on dromedaries ; and *Haemaphysalis bispinosa*, Neum., and *H. flava*, Neum., a few individuals being collected off calves and dogs, respectively.

It is remarked in conclusion that *Phlebotomus* spp., gadflies and houseflies require further study in Mesopotamia.

SENIOR-WHITE (R. A.). **A Survey of the Culicidae of a Rubber Estate.**—*Ind. Jl. Med. Res., Calcutta*, viii, no. 2, October 1920, pp. 304–325, 3 plates, 2 figs. [Received 6th July 1921.]

The situation and topography of a rubber estate in Ceylon, where observations were made on the Culicid fauna, is described, and all the breeding places are reviewed in some detail, with a map and illustrations. The Malayan element in the fauna of the lower hills is very marked. Notes are given regarding nine species of *Anopheles* and twenty-one other Culicids collected during the survey. The only malaria-carrier of importance on the estates in the area examined was *A. maculatus*. This species breeds all the year round, and in every natural collection of water except the river. The malarial incidence is, however, insufficient to justify any very expensive measures for its eradication. *Stegomyia fasciata*, the yellow fever mosquito, has not been found.

FERGUSON (E. W.). **The Malaria Danger.** [Correspondence.]—*Med. Jl. Australia, Sydney*, 8th Yr., i, no. 21, 21st May 1921, p. 432.

The question of the establishment of endemic foci of malaria in New South Wales has prompted the author to record in this letter the occurrence of Anopheline mosquitos. The information has been collected from records mostly already published.

There are five species of *Anopheles* in Australia :—*A. annulipes*, Walk., *A. atratipes*, Skuse, *A. stigmaticus*, Skuse, *A. corethroides*, Theo., and *A. barbirostris*, Wulp, var. *bancrofti*, Giles. The two latter occur in southern Queensland and have not been recorded in New South Wales. The most common mosquito is *A. annulipes*. Its range probably extends over the whole of Australia and it occurs throughout New South Wales, with the possible exception of the higher mountain ranges and the trans-Darling country. Along the coast the species is widespread but not as abundant as it is inland.

It is thought that there is little likelihood of endemic malaria following the return of infected troops, owing to the relative scantiness of mosquitos in urban areas, and the scattered population in country areas. Settlers known to have suffered from the disease have been excluded from one district likely to prove an exception.

The estimation of the chances of infection in any locality is not simple. As Ross points out this depends on the average of the population, the number of infected persons, the number of those whose blood contains enough sexual forms of the parasite to infect Anophelines, the number of *Anopheles*, the number of those which feed on a single person, the proportion surviving one week, and the proportion of survivors that bite again. Ross calculates that one quarter of Anophelines succeed in biting human beings and only a third of these survive a week, and only a quarter of the remainder succeed in biting a second person. Hence only one in forty-eight is ever likely to give infection. In the future it is hoped to continue mapping out the distribution of mosquitos and investigation of places from which endemic cases are reported.

KEILIN (D.). **On the Life-history of *Helicosporidium parasiticum*, n. g., n. sp., a new Type of Protist parasitic in the Larva of *Dasyhelea obscura*, Winn. (Diptera, Ceratopogonidae) and in some other Arthopods.**—*Parasitology, Cambridge*, xiii, no. 2, June 1921, pp. 97–113, 3 plates, 5 figs.

The systematic position and life-history of *Helicosporidium parasiticum* are described. The larvae of *Dasyhelea obscura* are susceptible to infection in all stages, probably owing to their feeding habits. Those examined were found in the decomposed sap in wounds of elm and chestnut trees. The other hosts of this parasite are *Rhyphus fenestralis*, Scop., *Mycetobia pallipes*, Meig., *Aulacogaster rufitarsis*, Meig., larvae of Eristalids, *Systenus adpropinquans*, Loew, *Phaonia cincta*, Zett., and the Tyroglyphid, *Hericia hericia*, Robin.

Buxton (P. A.). **The External Anatomy of the** *Sarcoptes* **of the Horse.**—*Parasitology, Cambridge*, xiii, no. 2, June 1921, pp. 114–145, 1 plate, 22 figs.

As a result of the suggestion made by Warburton [*R. A. E.*, B, viii, 219] the anatomy of the various stages of *Sarcoptes scabiei equi* are here described as accurately as possible. A key for distinguishing the larva, nymph, and male and female adult, is given.

Buxton (P. A.). **On the** *Sarcoptes* **of Man.**—*Parasitology, Cambridge*, xiii, no. 2, June 1921, pp. 146–151, 9 figs.

A comparison is drawn between the anatomy of *Sarcoptes scabiei hominis*, Hering, and *S. scabiei equi* [see preceding paper]. The species known as *Sarcoptes scabiei-crustosae*, Fürst., can only be distinguished from typical *S. scabiei* by characters that require an oil-immersion lens and micrometer for their appreciation; it must therefore be relegated to varietal rank, the name being *Sarcoptes scabiei scabiei-crustosae*, Fürst. The minuteness of the morphological differences between the species and variety is urged in opposition to the view held that *S. scabiei hominis* and *S. scabiei scabiei-crustosae* are distinct organisms producing essentially different diseases. Were the mite causing Norwegian crusted scabies really distinct from *S. scabiei hominis* it would probably have become extinct, as the disease is very rare. The need for further investigations on this subject is indicated.

Hindle (E.). **Notes on** *Rickettsia*.—*Parasitology, Cambridge*, xiii, no. 2, June 1921, pp. 152–159.

The results obtained from the examination of lice completely agree with those already recorded [*R. A. E.*, B, vi, 237; ix, 137]. It is suggested that the positive results obtained by Continental observers may be due to the prevalence of typhus and trench fever or to the existence in the alimentary canal of the louse of a *Rickettsia* that is non-pathogenic to man. *Rickettsia* were unquestionably very occasionally found in lice that had never fed on any one infected with either trench fever or typhus. The relation between *R. quintana* and *R. pediculi* may be an instance of a non-pathogenic *Rickettsia* having acquired the capacity of living in the blood of man and producing the pathogenic variety *R. quintana*. In the case of the latter the insect host merely furnishes a living culture tube in which the organisms grow and multiply without passing through any cyclical changes such as take place in the case of Protozoa.

R. melophagi, isolated from *Melophagus ovinus*, was found in the young offspring of infected *Melophagus*, and it seems probable that this infection is hereditary. It was also frequently associated with *Crithidia melophagi*. Other species dealt with are *R. trichodectae*, sp. n., from *Trichodectes pilosus* from the horse, and *R. linognathi*, sp. n., from the alimentary canal of the goat louse, *Linognathus stenopsis*.

As a result of various observations these organisms have been found to occur at least in two insects, *Trichodectes* sp. and *Psocus* sp., that do not feed on blood; it is therefore probable that *Rickettsia* represent a group of micro-organisms which primarily inhabit the alimentary canal of insects and other Arthropods. Some of these live saprophytically in the mid gut, whilst others, such as *R. prowazeki*, invade the tissues of their host. In the absence of an intermediate vertebrate host infection is probably transmitted by the presence of the organism in the excreta of the insect.

KEILIN (D.). **Supplementary Account of the Dipterous Larvae feeding upon Molluscs.**—*Parasitology, Cambridge*, xiii, no. 2, June 1921, pp. 180–183.

In this collection of Dipterous larvae known to feed on molluscs the species recorded are: *Melinda cognata*, Meig. [*R.A.E.*, B, viii, 24]; *Sarcophaga filia*, Pandellé; *S. melanura*, Meig.; *Engyzops pecchiolii*, Rond.; *Chrysomyia* (*Lucilia*) *dux*, Esch.; and *Sciomyza dubia*, Fln. Individuals previously recorded by the author as *Phora* sp., have now been identified as *Phora notata*, Zett., by Lundbeck, who has also proved that the species described by the present author as *Phora bergenstammi*, Mik., is *P. domestica*, Wood (1906). These two species are distinct and the differences are here noted.

NUTTALL (G. H. F.) & KEILIN (D.). **On the Nephrocytes of** *Pediculus humanus*.—*Parasitology, Cambridge*, xiii, no. 2, June 1921, pp. 184–192, 5 figs.

The hitherto unknown function of the two groups of special cells occurring in the thorax of *Pediculus humanus* has been determined as excretory-accumulatory and they are here referred to as nephrocytes. The observations described confirm those of previous authors with regard to the structure of these cells. Similar cells occur also in Mallophaga and have been wrongly described by some authors as salivary glands.

Rapport van de Plaatselijken Gezondheidsdienst te Soerabaja over het Jaar 1917. [Report of the Public Health Service at Soerabaya in 1917.]—*Meded. Burg. Geneesk. Dienst Ned.-Indië, Batavia*, ix, 1920, pp. 2–77, 8 plates, 9 maps, 4 charts, 9 appendices. (Also in English.) [Received 7th July 1921.]

The data relating to the incidence of malaria and the occurrence of Anopheline mosquitos in the Dutch East Indies have already been noticed from other papers.

FRANÇA (C.). **Observations sur le Genre** *Phlebotomus*. **II. Phlébotomes du Nouveau Monde.**—*Bull. Soc. Portug. Sci. Nat., Lisbon*, viii, pt. 3, 1920, pp. 215–236, 4 figs. [Received 7th July 1921.]

As a result of the author's paper on the European and North African species of *Phlebotomus* [*R.A.E.*, B, viii, 20] it was suggested that he should undertake the study of the American species. The present paper deals with the following species; *P. longipalpis*, Lutz & Neiva; *P. intermedius*, Lutz & Neiva, and *P. squamiventris*, Lutz & Neiva, from Brazil; and *P. migonei*, sp. n., from Paraguay.

WILSON (C. E.). **Insect Notes.**—*Rept. Virgin Islands Agric. Expt. Sta., 1920, Washington, D.C.*, 18th April 1921, pp. 32–33.

Every month of the year *Boophilus* (*Margaropus*) *annulatus australis* (cattle tick) was found on cattle. The heaviest infestation was in May, June and July.

Toads received from Barbados in January were infested with *Amblyomma dissimile* (reptile tick).

At St. Croix only three species of mosquitos were found : *Stegomyia fasciata* (*Aedes calopus*), *Anopheles albimanus*, and *Culex fatigans* (*quinquefasciatus*). The control measures used were draining mudholes and standing water, and spraying septic tanks, etc., with kerosene.

MESNIL (F.). **Variété des Voies d'Accès des Parasites à leurs Hôtes.** [Different Methods of Access of Parasites to their Hosts.]—*Bull. Soc. Path. Exot., Paris*, xiv, no. 6, 8th June 1921, pp. 310–315.

The known facts regarding the different methods by which parasites may gain access to their hosts are here detailed and the discoveries of various authors contributing to the knowledge of the subject are briefly reviewed.

DELANOE (P.). **De la Spirochétose des Gallinacés dans le Cercle des Doukkala.** [Spirochaetosis of Poultry in the Doukkala District, Morocco.]—*Bull. Soc. Path. Exot., Paris*, xiv, no. 6, 8th June 1921, pp. 316–320.

The occurrence of spirochaetosis in fowls, ducks and geese in the Doukkala district is recorded. The malady may be either acute, rapidly ending in death, or chronic, causing more or less complete paralysis of the lower limbs. It is very probable that there is also a benign form, with more or less complete absence of symptoms of disease. The carrier is *Argas persicus*, Fsch., which is abundant in all fowl-houses, especially in summer, to such an extent that it is impossible to keep the birds shut up. It would be interesting to discover whether the causal agent of spirochaetosis of fowls in Morocco is the same as that in Algeria.

LAVERAN (A.) & FRANCHINI (G.). **Des Hématozoaires du Gecko et spécialement de** *Herpetomonas tarentolae*. **Procédé simple de Culture des** *Herpetomonas*.—*Bull. Soc. Path. Exot., Paris*, xiv, no. 6, 8th June 1921, pp. 323–326.

The findings of various haematozoa in the gecko (*Tarentola mauritanica*) in Algeria and Tunisia by different workers are briefly reviewed. During the summer of 1920 the authors examined 17 individuals of *T. mauritanica* from various parts of Italy. Trypanosomes were found in seven of these, though only numerously in one, while eight revealed *Herpetomonas*. In three cases the former only were found, and in four cases the latter only ; in four cases both occurred together. These Haematozoa frequently escape observation by direct examination ; the cultural method of determining their presence is described.

SENEVET (G.) & VIALATTE (C.). **A propos d'***Ornithodorus marocanus*, **Velu, 1919.**—*Bull. Soc. Path. Exot., Paris*, xiv, no. 6, 1921, pp. 331–333.

Velu in 1919 described a new species of *Ornithodorus*, to which he gave the name *O. marocanus*, enumerating the characteristics distinguishing it from *O. turicata*, to which it is nearly allied [*R. A. E.*, B, vii, 86]. The authors of the present paper, examining some individuals of *Ornithodorus* collected in Morocco, observed a constant characteristic not mentioned by Velu, though it occurs in his type specimens, namely, the presence on each side of the camerostome of two processes which incompletely covered the buccal parts. These structures are generally composed of three or more pieces. Velu's description is therefore completed by the addition of this feature. The authors regard the species in question not only as resembling *O. turicata*, but as being intermediate between *O. turicata* and *O. talaje*.

ROUBAUD (E.) & LEGER (M.). **Observations sur le Paludisme en Corse, (Mars-Avril 1921).** [Observations on Malaria in Corsica (March–April 1921).]—*Bull. Soc. Path. Exot., Paris*, xiv, no. 6, 1921, pp. 340–351.

The Institut Pasteur had been studying the problem of malaria in Corsica since 1912, but research was interrupted by the War. Clinical reports during the last few years have all recorded a distinct recrudescence of the disease, many cases occurring even in the winter, under circumstances that made it impossible to decide whether they were primary or recurrent attacks. The authors therefore undertook a survey of the island during March and April, visiting principally the more highly infected regions. The incidence of the disease in various districts is discussed ; a marked recrudescence was noticeable in all directions ; in Casabianda, for example, the index for children examined was 37½ per cent., as compared with 12½ per cent. in 1912. The cause of this general recrudescence was unknown. Meteorological conditions in the preceding year had been adverse to the multiplication of Anophelines, the season being so dry that breeding-places were reduced to the minimum. Certain conditions may, however, have fostered the disease, such as movements of the population, introduction of the parasite from outside sources, the different standard of living, etc.

At the season in which these observations were made, when Anopheline activity was only just beginning, no gravid females were found in houses ; all those examined showed ovules still in course of development, so that all the haematozoa found in human beings were due to previous infections.

Out of sixteen cases examined, gametes were only found in three (*Plasmodium vivax* twice, *P. praecox* once), which points to the important conclusion that the sexual elements upon which the next epidemic will depend appear at the same period, practically in the same proportions for the two forms, without their relative frequency bearing any relation to the schizonts in the blood. This is contrary to previous observations recorded by Grassi, who found the crescent form appearing in Italy only in July, quite suddenly, in primary infections. In Corsica, Anophelines may evidently become infected by the parasites of both forms almost equally from the beginning of spring. In two children examined, who showed no symptoms of disease, one revealed gametes of *P. vivax* and the other of *P. praecox* in almost the same proportion, without any admixture with schizonts. This finding is in accordance with the theory previously expounded [*R. A. E.*, B, vi, 230–235], namely, that the ulterior differentiation of the primary infection in favour of the benign tertian type, during the early warm months, is due, at least in part, to the more rapid development in the mosquito of *P. vivax*. This organism, entering the human system first owing to its more rapid development in the mosquito, will later on mask at first the manifestations of the aestivo-autumnal parasite, inoculated later. This theory explains, at least in part, the curious facts of succession of the seasonal epidemiology of the two parasites, without recourse to the hypothesis of problematical and inexplicable change advanced by the partisans of the unicist theory. Doubtless the direct action of climate has some influence also on the seasonal appearance of the various species of *Plasmodium* in the blood.

A study of the relations of Anophelines to farm animals and poultry in Corsica is of particular interest for the purpose of comparison with observations in those parts of the Continent where the same species (*A. maculipennis*) occurs, as in la Vendée, where it appears in no less numbers, although malarial infection is very much less [*R.A.E.*, B, viii, 141]. In the most heavily infected parts of Corsica, such as the eastern coast, domestic animals are present in considerable numbers, at least until the summer emigration of the herds to the hills. In all the localities visited by the authors, however, in spite of the most thorough examinations of the buildings occupied by animals, Anophelines were practically never found there, although in human habitations they were nearly always present. In Corsica 80 per cent. of the Anophelines taken in houses were gorged with blood, while in the Vendée region the percentage was only 14. The conclusion has been reached, after careful observations, that *A. maculipennis* is as much attracted to cattle in Corsica as on the Continent, but that the type of building used for sheltering animals is totally unattractive to the mosquito. The stables and sheds are frequently open to the air, or have holes in the roofs where the wind and sun can penetrate ; others are too large and have very high ceilings. This confirms Wesenberg-Lund's theory, that in Denmark the disappearance of malaria coincides with agricultural development and with the perfecting of the stabling of animals that previously had only primitive or no shelter for the night [*R.A.E.*, B, ix, 82].

Prophylaxis against malaria is progressing satisfactorily in Corsica, but is not sufficient without other protective measures. Anti-larval measures have scarcely been begun, and require much more serious attention. The recent introduction of trioxymethylene powder as an efficient larvicide should much facilitate control on the large stretches of marshy ground. Drainage is an important question. Animal prophylaxis seems to be one of the principal means of ridding human habitations of the mosquito pest ; it is absolutely necessary for this that the animals should be sheltered in permanent stables, at least after sundown, the buildings being not too high and properly built. Simple shelters made of branches or pressed earth and covered with a thatch are quite sufficient, but the tops of these must be thoroughly closed in and protected by a strong roof and sides ; small, low shelters are much preferable to the high buildings so common in Corsica ; the height should not be more than 11 ft. 6 in. from the ground. The chief objection to such buildings is that cattle would feel the heat too much in the hot season ; to obviate this, the lower part could be made easily removable ; the essential is that, about halfway up, the walls should become so thick and dark that the Anopheline, immediately after having fed, would find suitable shelter. The construction of rabbit hutches should follow the same plan. Poultry are useless in this respect, as *A. maculipennis* only very exceptionally attacks them.

At the present time there is a general emigration of men and cattle in the hot season, especially from the east coast of Corsica, to the hills. The result is that during the period when Anophelines reach their maximum numbers there remain in the plain only a few small agriculturists, indispensable railway officials, etc., in the presence of an excessive and very hungry Anopheline population that finds no other host. The danger to man is obvious. It is hoped, however, that if considerable improvements are made in the conditions of life on the plain, by better water supply, quinine prophylaxis, antilarval measures and suitable stabling for animals, it may be possible to retain both agriculturists and their cattle there during the hot season. The task is a heavy one, but the future development, even the life itself of Corsica, depends upon its execution.

WESENBERG-LUND (C.). **Sur les Causes du Changement intervenu dans le Mode de Nourriture de l'** *Anopheles maculipennis.*—*C.R. Soc. Biol., Paris,* lxxxv, no. 26, 16th July 1921, pp. 383–386.

In this paper the author amplifies his theory regarding the change of habits of *Anopheles maculipennis* in Denmark and the consequent disappearance of malaria from that country [*R.A.E.*, B. ix, 83]. He considers that, besides the change in agricultural practices, the geographical situation of the country has also had some bearing on the phenomenon, Denmark being the extreme northern limit of the species. It is a noticeable fact that the change remarked in Denmark may also be traced in other regions of Europe where malaria has previously been prevalent and has now almost entirely disappeared. This is particularly true of the countries north of the Alps, where, by reason of easy conditions of life and abundant nourishment in cattle sheds, *A. maculipennis* is found to have appreciably increased in size, while south of the Alps, where it is always the chief malaria-carrier, the domestic animals spend the greater part of the year entirely out of doors. A hypothesis that appears probable to the author, but which requires further research in Germany for its verification, is that the *Anopheles* that now attack man are those that have over-wintered, while the summer generations feed only on the blood of animals. This would explain the curves of malaria incidence which, towards the north, do not generally show two maximum heights, but only one, which falls in May. Much still remains to be discovered on this subject; in particular, information is desirable on the life of the malarial parasites during the periods when epidemics remain stationary.

The author again calls attention to the work of Roubaud [*R.A.E.*, B, viii, 141], according to whom the changes in the life of *A. maculipennis* are the results of a slow and steady evolution in the feeding habits of the Anopheline. The author views them, however, as a phenomenon that has appeared with almost incredible rapidity. He believes that *A. maculipennis*, as living north of the Alps, does not represent a distinct subspecies or local race, but is simply a contingent of individuals developing physical and physiological features other than those that usually characterise their species. For the moment, the bond between Anopheline and man is broken in the latitude in question, but the cycle might be resumed at any time, though as a matter of fact the renewal of great malarial epidemics is a most unlikely occurrence.

WESENBERG-LUND (C.). **Les Anophélinés du Danemark et les Fièvres paludéennes.** [The Anophelines of Denmark and Malarial Fevers]. —*C. R. Soc. Biol., Paris,* lxxxv, no. 26, 16th July 1921, pp. 386–387.

Three species of Anophelines occur in Denmark :—*Anopheles plumbeus,* which is rare ; *A. bifurcatus,* which lives for preference in the forests and bites at nightfall ; and *A. maculipennis,* which when the present study was undertaken was almost undiscoverable. Two years' study of *A. maculipennis* has shown that this species lives all its life in stables and outhouses, only leaving them for mating and oviposition, feeding always on domestic animals and attacking man only in default of cattle. The chain of events that has led to the disappearance of malaria in the country where it was formerly so prevalent is briefly touched upon [see preceding papers].

METALNIKOW (S.) & GASCHEN (H.). **Sur la Rapidité d'Immunisation chez la Chenille de** *Galleria.*—*C. R. Soc. Biol., Paris,* lxxxv, no. 24, 2nd July 1921, pp. 224–226.

Pursuing the investigation of the immunity of *Galleria mellonella* to various microbes, further experiments were made, such microbes as *Proteus, Bacillus coli* and the cholera vibrio, all of which are highly virulent to the caterpillar, being used as vaccines. Immunity was again easily obtained. It was also found that protection against fatal doses could be assured within three hours of the injection of the vaccine, and that weak doses of the latter acted more rapidly than strong ones. Furthermore, the caterpillars transmit their immunity to the resultant moths.

ZOTTA (G.). **Un** *Leptomonas* **du Type** *L. davidi,* **Laf., chez des Euphorbes de France.**—*C. R. Soc. Biol., Paris,* lxxxv, no. 24, 2nd July 1921, pp. 226–228.

A flagellate, held by the author to be *Leptomonas davidi,* Laf., was observed by him in *Euphorbia esula* var. *mosana* and *E. helioscopia* from Maine-et-Loire, this being the first record of Leptomonads in *Euphorbia* in France.

The various published papers on Leptomonad infection in *Euphorbia* are mentioned with references.

DU BUYSSON (H.). **Observations sur les Moeurs du** *Simulium cinereum,* **Macq. (Dipt.).**—*Miscellanea Ent., Uzès,* xxv, no. 9, May–June 1921, pp. 65–66.

Simulium cinereum, Macq., is recorded as causing discomfort to cattle and horses while out in pasture in March, by continually attacking the inside of their ears. It is suggested that it may possibly convey certain diseases, such as foot and mouth disease and other septic infections. To prevent attack a diluted solution of cresol should be applied to the ears of animals put out to pasture during this season of the year.

PILI (R.). **Igiene del Coniglio e degli Animali di Bassa Corte.** [The Hygiene of the Rabbit and of Domestic Birds.]—*Allevamenti, Palermo,* ii, no. 7, 1st July 1921, pp. 212-216.

Rabbit mange is due to *Sarcoptes,* if in the nose, and to *Dermatodectes cuniculi,* if in the ears. The infestation yields to treatment with quassia soap, Helmerich's pomade [*R.A.E.*, B, vi, 111], or that advised by Prof. Alessandrini, which is made up of chloroform 1 part, petroleum 1 part, and olive oil 2 parts.

FRANÇA (C.). **An early Portuguese Contribution to Tropical Medicine.**—*Trans. R. Soc. Trop. Med. & Hyg., London,* xv, no. 1-2, 18th March-20th May 1921, pp. 57-60.

This paper deals with the scientific discoveries made by the Portuguese in the 15th and 16th centuries.

Gaspar Affonso (1596) gives one of the most complete accounts of *Dermatophilus penetrans,* showing that these fleas, contrary to the statements in works on tropical pathology, existed in the sixteenth century in India as well as Brazil.

In 1587, Gabriel Soares de Souza, in an interesting description of Brazil, clearly states the part insects play in the transmission of *Framboesia tropica.* He says that flies suck poisons from sores, then leave them in abrasions on healthy persons, and thus many people are infected. It is not until recent times that the conditions necessary for the transmission of this disease by flies has begun to be understood, and in 1907 Castellani demonstrated experimentally that flies can transmit *Treponema pertenue.*

JOHNSTON (T. H.). **The Sheep Maggot Fly Problem in Queensland.**—*Queensland Agric. Jl., Brisbane,* xv, pt. 6, June 1921, pp. 244-248, 1 plate.

Sheep-maggot flies in Queensland cause an annual loss of sheep of about 5 per cent. Artificial control, by means of chemical applications, however successful, does not reduce the fly preponderance, and has to be repeated each year. This paper deals with investigations into methods of reducing the pest by means of natural enemies, which have been carried out in Brisbane for the last few years.

The following are the more important blowflies recorded near Brisbane: *Chrysomyia* (*Pycnosoma*) *rufifacies* (sheep or hairy maggot fly), *Chrysomyia* (*Microcalliphora*) *varipes* (small hairy maggot fly), *Lucilia* spp. (*L. sericata* is usually applied, but several distinct species are included in this term in Australia), *Anastellorhina* (*Paracalliphora*) *augur, Ophyra nigra* (small shining black blowfly), *Sarcophaga* sp., *Chrysomyia* (*Lucilia*) *dux* (deep blue blowfly), *Chrysomyia incisuralis, Neocalliphora ochracea, Pollenia* (*Neopollenia*) *stygia* (golden-haired blowfly), *Synthesiomyia brasiliana, Muscina stabulans, Ophyra analis,* and *Calliphora erythrocephala* (which occurs in Sydney, but has not been observed in Queensland). A summary of results regarding the first six flies from work carried out in the University Laboratory is here given. The total life-cycle of the first three lasts from 9-14 days, and the next three from 19-40 days.

The following Hymenopterous parasites, which destroy the flies in either the pupal or larval stage, have been studied in New South Wales and Brisbane. The Chalcid, *Nasonia brevicornis,* has been widely distributed [*R.A.E.*, B, vii, 100]. The female lays an average of 20 eggs in each pupa. *Dirhinus sarcophagae* [*R. A. E.*, B, viii, 60], has a life-cycle of 28 days in Brisbane. *Spalangia muscidarum* attacks house, bush and stable flies, blowflies and flesh flies. A single parasite emerges in 21–28 days from each infested pupa. Several other species have been recorded from Queensland, but their habits are not known. *Chalcis calliphorae* [*R. A. E.*, B., iv, 179] attacks the maggot stage, but has only once been recorded in Brisbane. An Encyrtid discovered last year attacks the maggots, which are destroyed after pupation, the adult parasites emerging in 21–23 days. It is being bred now in the Laboratory and should be tried in conjunction with *Nasonia* and *Spalangia*. *Hemilexomyia abrupta* has been found occasionally in New South Wales, but has not yet been recorded in Queensland. Diapriid parasites related to, but distinct from, the latter have been bred on one occasion from blowfly pupae. *Pachycrepoideus dubius* has been recorded from North Queensland as destroying house-flies, but its effect on blowflies is not known.

Unsuccessful attempts (as it was mid-winter) were made to obtain from England pupae parasitised by *Alysia manducator*, which oviposits in blowfly larvae, the adult emerging from the pupa. The accessibility of pupae to pupal parasites is a very important factor. Experiments prove that only 4 per cent. of the larvae pupate on the surface of the soil. Owing to the wandering habits of the larvae, the parasites that attack this stage have more opportunity of infesting them.

The Blowfly Pest.—*Queensland Agric. Jl., Brisbane*, xx, pt. 6, June 1921, pp. 249–253, 2 plates.

The work of the Special Blowfly Committee, appointed by the Commonwealth Institute of Science and Industry, was extended at Dalmally in February 1918, with a view to checking blowfly ravages in flocks. A flock of 14,000 was treated. The apparatus employed included a power dip and spray and jetting plant. The work and life-history of the Chalcid [*Nasonia brevicornis*] was also closely studied.

The various applications used in the experiments are given. Soap and water solution failed and the fly-trap method was not satisfactory.

Mr. W. A. Russell found from measures taken on his property that the jetting process checks fly attacks immediately, prevents losses, and for a time arrests further infestation. This process consists in forcing a mixture of arsenic and sheep dip through a mechanically operated nozzle at a pressure of 100 to 120 lb. Only the breech of the sheep is treated, and it is possible for one man to treat over 1,000 sheep a day in this way. Complete immunity may be secured for three or four months, though virulent attacks abate after a few weeks. So far non-poisonous specifics have proved valueless and the stronger the poison the greater the protection. Arsenic and other poisons are now being used in strengths that would have once been thought fatal. Very little arsenic is retained in the wool, and experiments with a much greater strength are going to be undertaken in order to fix it in the wool and so give complete immunity. Crutching is not necessary when jetting is done. Every remedy suggesting reasonable chances of success has been experimented with. An arsenical and oil mixture was tried with success, the arsenic being held in suspension, but this was a more expensive process. Mr. Russell attributes the failure of jetting in some cases to the use of an inferior grade of arsenic, and to its not being properly dissolved. He uses specifics mixed with arsenic up to 10 lb. to 100 gals., but does not recommend this strength for general use.

Mr. Russell considered Chalcid parasites important factors in the control of this pest. When a fly attack occurs, the parasites also become numerous and reduce the outbreak to normal. It is not thought that the parasites will control the pest so as to prevent it harming sheep, but an imported Chalcid might prove more effective. Fly attacks vary in severity according to the time of the outbreak and the species of fly then prevalent.

The Government Analyst stated that it had been proved that arsenic mainly adheres to the butt and middle of the wool. In new wool its pressure was greatest in the middle. He had found three months was the period of protection afforded by the jetting process.

DAVEL (D.). **Sarna ovina.** [Sheep Mange.]—*Bol. Minist. Agric. Nac., Buenos Aires*, xxvi, no. 1, January–March 1921, pp. 93–95. [Received 21st July 1921.]

The object of this article is to indicate practical measures against sheep mange. For curing the affection dips of lime-sulphur or lime-caustic soda are recommended. Prophylaxis includes isolation from infected places and disinfection of all sheds, etc., and of any sheep introduced from other establishments.

CASSAMAGNAGHI (A.). **Contribuição para o Estudo da Piroplasmose, e a Importação no Brasil de Reproductores finos.** [A Contribution to the Study of Piroplasmosis and to the Importation into Brazil of Pedigree Breeding Stock].—*Ann. Soc. Rur. Brasileira, S. Paulo*, no. 10, April 1921, pp. 600–606. [Received 21st July 1921.]

The conclusions reached by the author are, that the resistance acquired by bovines to piroplasmosis is not a vaccine immunity but an infection leading up to a tolerance on the part of the animal, and that if this peculiar condition is to be maintained, it is necessary that the infection be maintained, either by ticks or by virulent fluids. The success of immunisation depends on a number of factors, including the size of the dose, the age of the subject and its breed.

In very dry years ticks disappear owing to the lack of protective vegetation, but when later on rainy years set in, cattle begin to die. The fact that ticks are not uniformly distributed in the pastures accounts for the fatal cases that occur when animals are moved from one part of a ranch to another.

HALL (M. C.). ***Cuterebra* Larvae from Cats, with a List of those recorded from other Hosts.**—*Jl. Amer. Vet. Med. Assoc., Washington, D.C.*, lix (N. S. xii), no. 4, July 1921, pp. 480–484.

Dipterous larvae belonging to the genus *Cuterebra*, Clark, which includes such later genera as *Rogenhofera*, Brauer, *Bogeria*, Austen, and *Atrypoderma*, Townsend, were found on cats in Washington. The author presumes that, though cats are fairly often infested with *Cuterebra*, they are not the usual host.

A list is given of the larval forms of various species of *Cuterebra* occurring in a wide range of hosts. The first stage larva of *C. americana* has recently been noticed [*R. A. E.*, B, viii, 108].

BISHOPP (F. C.). **Flytraps and their Operation.**—*U.S. Dept. Agric., Washington, D.C.*, Farmers' Bull. 734, March 1921 (2nd revision), 16 pp., 7 figs. [Received 22nd July 1921.]

This bulletin is a revision of a previous edition, and the bulk of the information has already been noticed [*R.A.E.*, B, iv, 181].

A modification of the conical hoop trap is described.

Experiments in Texas prove that properly baited traps are a successful measure against the screw-worm fly, *Cochliomyia* (*Chrysomyia*) *macellaria*, F., injuring live-stock. All carcasses and animal refuse should be promptly burnt to prevent breeding. Traps should be kept near watering places and where cattle congregate. The conical traps here described should be set on a board platform two feet square, securely fastened to a tree, where the trap and bait will be the least disturbed by animals. Dried gut slime, 1 pt. slime to 10 or 20 pts. water, is a satisfactory bait.

An attractive bait for house-flies etc., is 1 lb. curd from milk and ½ lb. brown sugar, with sufficient water to moisten it; this will be effective for ten days or more if kept moist. Bran mash made thin with equal parts water and milk, with the addition of a few tablespoonfuls of brown sugar, and cornstarch and a yeast cake, is also a lasting bait.

HINE (J. S.). **Description of Horseflies from Middle America. II.**—*Ohio Jl. Sci., Columbus*, xx, no. 8, June 1920, pp. 311–319, 1 fig. [Received 25th July 1921.]

A key is given to separate the genera of PANGONIINAE occurring in Middle America, and the following new species are described:—*Pangonia melanopus* from Mexico, *P. delta* from Arizona, and *P. parishi* from Ecuador. The following new TABANINAE are also described:—*Tabanus punctipleura*, *Dichelacera melanosoma*, and *D. anatis* from Costa Rica, *T. fumomarginatus* from Brazil, *D. melanoptera* and *D. ochracea* from British Guiana, and *D. caloptera* from Mexico.

KUNHARDT (J. C. G.) & CHITRE (G. D.). **An Experiment in the Eradication of Plague Infection carried out in the Poona and adjacent Districts; First Report for the Period 1914-16.**—*Indian Jl. Med. Res., Calcutta*, viii, no. 3, January 1921, pp. 409–445, 13 tables, 13 charts, 5 maps.

KUNHARDT (J. C. G.) & CHITRE (G. D.). **Further Experiments in Plague Prevention carried out at Poona; Second Report for the Period 1916-18.**—*Ibid.*, pp. 446–489, 27 tables. [Received 28th July 1921.]

The first report describes experiments carried out in the Poona District from 1914–16 to eradicate plague by means of intensified rat destruction, but chiefly owing to the inadequacy of the methods employed the experiments were not successful.

The second report describes the technique employed in 1916–18 to determine the efficiency and the ingredients of various rat baits, and miscellaneous experiments with these baits, from which it was found that barium carbonate is the most efficient rat poison, and arsenious acid is a suitable substitute.

Christophers (S. R.) & Shortt (H. E.). **Malaria in Mesopotamia.**—*Indian Jl. Med. Res., Calcutta*, viii, no. 3, January 1921, pp. 508–552, 4 maps, 1 chart, 2 plates, 10 tables. [Received 28th July 1921.]

The geography, physical features and climate of Mesopotamia, and their relation to malaria are briefly described. The breeding places of Anophelines are peculiarly dependent on irrigation. The system of tidal creeks and channels on the lower rivers is very favourable to malaria, and makes any anti-malaria measures difficult. The river level has a marked effect on malaria. The long cold season, the limited period of rainfall, the salinity of the subsoil water and river water, and the great desiccation which tends to make surface waters unsuitable for the breeding of Anophelines, are all influences against malaria, while in lower Mesopotamia fish (CYPRINODONTIDAE) are an important factor.

The following mosquitos have been found :—*Anopheles pulcherrimus*, Theo., *A. stephensi*, List., *A. hyrcanus* (*sinensis*) var. *mesopotamiae*, Christ., *A. hyrcanus* (*sinensis*) var. *vanus*, Theo., *A. algeriensis*, Theo., *A. palestinensis*, Theo. (*superpictus*, Grassi), *A. maculipennis*, Meig., *A. maculipennis* var., *A. bifurcatus*, L., and *A. rhodesiensis*, Theo.

In the south the most important species are *A. pulcherrimus* and *A. stephensi*. The former is chiefly found in great swamps and the alluvial desert, while the latter is common in palm grove belts, breeding mainly in excavated ground and irrigation ditches. The most important species in the north are *A. palestinensis* and *A. maculipennis*. The habits of all species differ considerably. In the south breeding places are ubiquitous, in the north the facilities are diminished, but they increase in the submontane and hilly regions. In no part were wells found to be important breeding places. The breeding of *A. pulcherrimus* was at a standstill below 70°F., and above this it increased rapidly. *A. palestinensis* and *A. maculipennis* tolerated low temperatures. To the north of Baghdad the species are palaearctic and Mediterranean, while to the south they are partly oriental and partly indigenous. The chief malaria-carrier in the north is *A. palestinensis*, and in the south *A. stephensi*. In the former sporozoites were found in nature, also the zygotes of malignant tertian malaria. *A. pulcherrimus* is little associated with malaria and the remainder are rare or winter species.

The distribution of endemicity shows moderate spleen rates on the low rivers, low endemicity throughout the plains, and hyperendemicity in the northern submontane country.

Christophers (S. R.) & Shortt (H. E.). **Incidence of Malaria among Troops in Mesopotamia, 1916-19.**—*Indian Jl. Med. Res., Calcutta*, viii, no. 3, January 1921, pp. 553–570, 5 tables, 1 chart. [Received 28th July 1921.]

This paper contains information regarding malaria in the British forces operating in Mesopotamia during 1916–19. In various tables and appendices may be found figures of admissions to hospitals, data obtained from bacteriological laboratories, and the infection rate in troops shown by random samplings.

Nearly one-half of the total malaria in the forces occurred at the base. The admissions at the base were lowest in February, increasing slightly up to June. The highest occurred in October to December, although there was a considerable incidence in July. There was little evidence of local epidemic prevalence, except in areas where Anopheline breeding places were abundant. The fluctuations in malaria are clearly related to meteorological and physical conditions.

Tables are given showing the incidence of malaria in individual units. In 1917 residual and imported malaria was severe, owing to an epidemic prevalent in northern India. All three forms of parasites have occurred among troops, but quartan [*Plasmodium malariae*] was only 1 per cent. of the infections. The malignant tertian parasite [*P. praecox*] was more prevalent in the northern than in the Basra area.

The extremely complicated circumstances associated with malarial incidence in a large army as demonstrated in the Mesopotamian force are described.

CHRISTOPHERS (S. R.) & SHORTT (H. E.). **Anti-malaria Operations at Busra, 1916-19.**—*Indian Jl. Med. Res., Calcutta,* viii, no. 3, January 1921, pp. 571–592, 4 plates, 2 maps, 4 tables. [Received 28th July 1921.]

Systematic anti-mosquito operations were carried out on a large scale at the base, as here the camps were relatively permanent, and the conditions being highly malarious, it was important to protect the depôts through which all troops had to pass. In the advanced area, however, other measures had to be relied on, owing to the immense areas concerned and the constant movement of the troops.

Many disadvantages had to be contended with, such as the natural conditions of the country, and the extensive excavations that had to be carried out, these latter often adding considerably to favourable mosquito breeding places.

Oiling of extensive areas and any kind of drainage operations were impossible, so the chief control method employed was the protection of excavated areas in the neighbourhood of troops by cutting off irrigation. This method alone showed promise of results and definite reductions in sickness were indicated. Reclamation by means of dredging proved the best control method; unfortunately the areas that could be so dealt with were too small to allow other measures to be rejected.

The protective action taken in different areas and that undertaken by the Sanitary Section are described. Tables showing an analysis of admissions to hospital from protected and unprotected areas are given.

Spinose Ear Tick.—*Jl. Dept. Agric. Union S. Africa, Pretoria,* iii, no. 1, July 1921, p. 15.

The occurrence of the spinose ear tick [*Ornithodorus megnini*] is recorded from Avoca, Cape Province, where it was taken from the ear of a Friesland calf. The neighbourhood is not considered favourable for ticks that live on cattle, and apparently *O. megnini* has but recently been introduced. It remains to be seen whether it will become fully established.

NOTICES.

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Kawamura (R.), Hattori (T.) & Yamaguchi (M.). **On the Relation between the Bird and the Red Mite, in Special Reference to the Prevention of Tsutsugamushi Disease.**—*Tokyo Iji Shinshi* [*Tokyo Med. News*] no. 2213, February 1921. (Abstract in *Japan Med. World, Tokyo,* i, no. 2, 20th June 1921, p. 21.)

On examination, the authors found birds of all the species in which the tsutsugamushi disease occurs, infested with red mites, except water-fowl and hawk-eagles. The species of red mites and the season in which they occur agree completely with those found in experimental mammals, the birds being infested in the same manner.

The authors think that the eradication of rats is rightly considered an essential factor in the prevention of this disease, though all warm-blooded animals must be regarded as dangerous.

Patton (W. S.) & Sundara Rao (—). **Studies on the Flagellates of the Genera** *Herpetomonas, Crithidia* **and** *Rhynchoidomonas.* **No. 2. The Morphology and Life-history of** *Crithidia ctenocephali,* **sp. nov., parasitic in the Alimentary Tract of** *Ctenocephalus canis,* **Curtice.**

Patton (W. S.). **No. 3. The Morphology and Life-history of** *Rhynchoidomonas siphunculinae,* **sp. nov., parasitic in the Malpighian Tubes of** *Siphunculina funicola,* **de Meijere.**

Patton (W. S.). **No. 4. The Morphology and Life-history of** *Herpetomonas siphunculinae,* **sp. nov., parasitic in the Alimentary Tract of** *Siphunculina funicola,* **de Meijere.**

Patton (W. S.) & Sundara Rao (S.). **No. 5. The Morphology and Life-history of** *Herpetomonas pulicis,* **sp. nov., parasitic in the Alimentary Tract and Malpighian Tubes of** *Pulex irritans,* **L.**

Patton (W. S.), La Frenais (H. M.) & Sundara Rao (—). **No. 6. Note on the Behaviour of** *Herpetomonas pulicis,* **Patton and Sundara Rao,** *Crithidia ctenocephali,* **Patton and Sundara Rao, and** *Herpetomonas muscae domesticae,* **Burnett, in the Bed Bug,** *Cimex hemiptera,* **Fabr.**—*Indian Jl. Med. Res., Calcutta,* viii, no. 4, April 1921, pp. 593–632, 5 plates. [Received 28th July 1921.]

These papers, as indicated in their titles, give an account of various *Herpetomonas, Crithidia* and *Rhynchoidomonas* known to occur in fleas, eye flies and bed-bugs.

The conclusions of the authors are as follows :—*Crithidia ctenocephali* is a typical member of the genus, and is parasitic in the alimentary tract of the larva, pupa and adult of *Ctenocephalus canis.* It is acquired by the larva when feeding on the excreta of the adult insects. The small round preflagellates closely simulate the round stage of the parasite of kala-azar and should not be confused with any stages of these pathogenic flagellates. The flagellate stage is best seen in the stomach of the larva. The post-flagellate stage may be found in the larva, but more usually in the hind gut and rectum of the adult insect; it is passed out in the faeces of the flea and is again ingested by the larva. So far as is known this parasite has no connection with any trypanosome in the blood of the dog, never having been found in the blood of the dog or in the stomachs of dog fleas, so it is a natural parasite of the flea. It has not proved possible to infect dogs with it, but it is probable that white mice may be infected.

Rhynchoidomonas siphunculinae is a natural parasite of the eye fly, *Siphunculina funicola*, living in its malpighian tubes, but is in no way connected with the *Herpetomonas* found in the alimentary tract. It is never acquired by the larvae in feeding, whereas *Herpetomonas* develops normally in the larva. It is a typical flagellated organism and is distinct from either *Herpetomonas* or *Crithidia*. The life-history of the parasite is identical with that of the other insect flagellates of the genera *Herpetomonas* and *Crithidia*. It is acquired by the fly when it ingests the post-flagellate stages passed out in the faeces of another fly.

Herpetomonas siphunculinae is a natural parasite of the eye fly, living in its alimentary tract. It develops normally in the alimentary tract of the larva. At a late stage, this parasite exhibits a characteristic trypanosome appearance, and may easily be mistaken for a true trypanosome. It is in no way connected with any blood parasite. In the process of time it may become a pathogenic organism, as its host feeds on discharges from sores, etc. For this reason it is important that the natural breeding grounds of *Siphunculina funicola* be discovered, though large numbers collecting on bits of string, cobwebs, etc., may be destroyed by burning.

Herpetomonas pulicis is a natural flagellate of *Pulex irritans* and probably occurs wherever the host is found. The flea is infected in its larval stage, the parasites then living in the stomach of the larva and pupa, only appearing in the malpighian tubes of the adult insect some time after it has emerged. The parasites collect in the flea's rectum, and forming small round resistant post-flagellates are passed out in the faeces of the flea. The parasite can be cultivated on the well known NNN medium, and fleas feeding on the cultures are readily infected.

Experiments were carried out to observe the behaviour of *Herpetomonas pulicis, H. muscae-domesticae* and *Crithidia ctenocephali* in the alimentary tract of the bed-bug, *Cimex hemiptera*, F. The bugs were fed on cultures of the parasites, and their mid-gut, hind-gut, and rectal contents cultured on successive days. It was found that the three flagellates were able to live in the alimentary tract of the bed-bug, which is not their normal insect host, for long periods (*H. pulicis* 37 days, *C. ctenocephali* 8 days, and *H. muscae-domesticae* 45 days), which shows that the mid-gut, hind-gut and rectum of the bug is an excellent environment for their growth and multiplication.

GILL (C. A.). **The Rôle of Meteorology in Malaria.**—*Ind. Jl. Med. Res., Calcutta*, viii, no. 4, April 1921, pp. 633–693, 1 map, 1 fig., 1 chart. [Received 28th July 1921.]

This study of the influence of meteorology in the incidence of malaria in the Punjab leads to certain conclusions, which are however put forward tentatively, and it is recognised that further investigation for the purpose of their corroboration and amplification is necessary.

The climate and meteorology of the Punjab, the distribution of endemic and epidemic malaria, the correlation between temperature, humidity, rainfall and malaria, and the potential infection period, are discussed. Experimental observations on the effect of humidity, temperature and pressure on the longevity and habits of mosquitos and their power to transmit infection, show that *Culex fatigans* is influenced to a marked degree in its longevity and habits by the relative humidity of the atmosphere [*R. A.E.*, B, ix, 86]. As regards pressure, experiments have shown that at a temperature between 77°F. and 83°F. and a relative humidity of approximately 100 per cent. and at an atmospheric pressure of approximately 23 inches of mercury, the longevity of *C. fatigans*, up to ten days, is not affected by a reduction in pressure corresponding to a height of between 5,000 and 6,000 feet above sea-level. Under the above conditions, the development of *Proteosoma grassii* (the parasite of bird malaria) in *C. fatigans* proceeds in a normal manner.

FAUNTLEROY (C. M.). **A Portable Cyanide Gas Generator for fumigating small Compartments.**—*Pub. Health Repts., Washington, D.C.*, xxxvi, no. 26, 1st July 1921, pp. 1504–1510, 1 plate, 1 fig.

The apparatus described and illustrated is designed for use in the fumigation of small compartments on ships by fractional generation of hydrocyanic acid gas. The gas is produced by a combination of dilute commercial sulphuric acid and dry sodium cyanide in a portable generator, and is discharged into the sealed compartments, from the outside, through a keyhole, ventilator or other small opening. The keg generator consists of an ordinary 15-gallon beer keg, with a simple superstructure comprising a cyanide hopper, long-stem valve and discharge pipe. A sectional diagram of the apparatus is given, with explanations of structure, materials and measurements, all the parts being easily obtainable and readily put together. The preparation for fumigation and the actual operation are described and also the method of cleaning the apparatus (which is most important). The advantages of this apparatus are that it is portable, safe, efficient and rapid, requiring little labour, entailing very little expense and will remain in serviceable condition over a long period of time.

HILDEBRAND (S. F.). **Suggestions for a Broader Application of *Gambusia* for the Purpose of Mosquito Control in the South.**—*Pub. Health Repts., Washington, D.C.*, xxxvi, no. 25, 24th June 1921, pp. 1460–1461.

The value of the fish, *Gambusia*, in mosquito control is discussed [*cf. R.A.E.*, B, vii, 162], and its distribution to all standing and sluggish waters, so far as possible, is suggested. Ponds that are easily accessible and adapted to the propagation of the fish should be used to breed them for general distribution. Every effort should be made to educate the public as to the importance of this fish and where a supply of it may be obtained free.

SINTON (J. A.). **Relapsing Fever at Meshed, North-East Persia.**—*Indian Med. Gaz., Calcutta*, lvi, no. 7, July 1921, pp. 241–250, 5 tables, 11 charts.

A number of cases of recurrent fever are described that occurred in north-east Persia in 1918. The infection was apparently carried by lice [*Pediculus*], as measures directed against them stopped the spread of the outbreak among the troops and hospital personnel, although no measures were taken against bed-bugs [*Cimex*] which were also present in the quarters of the troops. No ticks were observed in the hospital buildings. The presence of numerous spirochaetes in a louse taken from a patient tends to confirm this theory.

JEPSON (F. P.) & KNOWLES (C. H.). **Division of Entomology.**—*Fiji Dept. Agric. Ann. Rept. 1919, Suva,* Council Paper no. 65, 1920, pp. 7–14. [Received 3rd August 1921.]

A disease to which young chickens in Fiji are particularly liable is known as chicken-pox warts or sorehead. It is commonly thought to be caused by mosquito bites, the sores arising from the scratching of irritating spots. As nothing is definitely known regarding the connection between mosquitos and the disease, it is suggested that some birds should be kept in mosquito-proof enclosures in order to see whether the disease would arise and spread among them.

BARGE (J.). **L'Emploi du Jus de Nicotine contre les Insectes.**—*Rev. Agric. Afr. Nord, Algiers,* xix, no. 104, 29th July 1921, p. 585.

Nicotine solutions are said to be very efficacious in curing mange in animals. For sheep, a lotion is made containing 0·12 or 0·13 per cent. of nicotine ; to this is added a weight of soda crystals double the weight of the pure nicotine.

GHESQUIÈRE (J.). **Note sur quelques Parasites des Oiseaux au Congo belge.**—*Ann. Gembloux, Brussels,* xxvii, no. 7, July 1921, pp. 239–242.

The parasites of poultry and other birds in the Belgian Congo include :—*Filaria gallinarum,* Theil., causing intestinal filariasis in about 80 per cent. of fowls and having for its intermediate host the termite, *Hodotermes pretoriensis,* Full. ; the Acarid, *Cnemidocoptes mutans,* Rob., causing mange of the feet, especially in native fowls ; the tick, *Argas persicus,* Oken, which apparently causes death in poultry, although the presence of *Spirochaeta gallinarum* has not been recorded ; Mallophaga, causing phthiriasis ; the flea, *Echidnophaga* (*Sarcopsylla*) *gallinacea,* Westw., which produces a high mortality among fowls, generally infesting the head in large numbers, and having dogs and cats for alternative hosts ; *Amblyomma hebraeum,* Koch, causing heartwater, frequently ending fatally, in turkeys ; the Hippoboscid fly, *Lynchia maura,* Big., transmitting *Haemoproteus columbae* in pigeons and very common in pigeon lofts.

A tour of the eastern and western provinces of the Belgian Congo, undertaken after the writing of this paper, has disclosed the following additional poultry parasites :—the Acarid, *Dermanyssus gallinae* ; a new species of Reduviid ; *Lipeurus ? heterographus* ; and the Acarid, *Sarcoptes laevis,* causing mange.

These parasites are responsible for a certain mortality, and are the cause of epizootics, many of them, in the absence of their preferred host, attacking other animals, including man. A note will be published shortly on the remedial measures that have been used with success.

ALFIERI (A.). **Note sur la dernière Invasion de** *Periplaneta americana,* **L. (Orthop.).**—*Bull. Soc. Ent. Egypte, Cairo,* xiii (1920), 1921, pp. 16–17.

In the summer of 1919 the cockroach, *Periplaneta americana,* L., was remarkably abundant in Egypt, presumably in consequence of the presence of large supplies of food for the army. Spreading from the depots, storehouses and cellars the cockroaches entered houses, particularly during the night through open doors and windows, thus rendering remedial measures almost useless. Killing the larvae and adults, plastering up holes likely to shelter them, and destroying the egg-masses were all tried without appreciably diminishing the numbers present the next day. Borax however proved of great utility, either scattered about in corners or mixed with a thick syrup and spread on pieces of tinplate and placed under cupboards or other places where the cockroaches sheltered.

WILHELMI (J.). **Das Panke-Lietzengrabengelände bei Berlin als Kriebelmückenschadgebiet und die Immunitätsfrage.** [The Districts around the Panke and Lietzengraben near Berlin as a dangerous Simuliid Area and the Question of Immunity.]—*Deutsche tierärztl. Wochenschr., Hanover,* xxix, no. 31, 30th July 1921, pp. 383–384.

The area around the Panke and the Lietzen canal near Berlin is favourable for studying the bionomics of Simuliids. An examination on 7th March 1921 showed an abundance of larvae, but no pupae, which corroborates previous negative findings as to pupal hibernation. Furthermore, the larvae were found in channels where none had been seen in the preceding summer, when the water was at a lower level. The winter level must therefore be taken as the standard, and this all the more so as the dangerous spring swarms come from eggs laid in autumn. On 30th March mature pupae of *Simulium* (*Odagnia*) *ornatum* and a few adults were found. The swarming period closed on 28th April. On the 27th a bull died that had been put out to graze the previous day, and the author believes this death to be caused by *S. ornatum.* A toxicological examination of dried specimens of this Simuliid is being made with a view to clearing up this point. As regards immunity, this case affords another instance of an animal dying shortly after being put out to pasture, whereas others that have been grazing for a longer period survive. It is possible that in the case of early pasturing in regions with a sea climate and with a transition climate, immunity is conferred owing to the early and gradual emergence of the Simuliids, and that the varying number of deaths in regions with a land climate may be due to a more or less sudden emergence and to the varying degree of immunity acquired. It is remarkable that draught cattle, which spend the winter in the open or are put out early in the year, remain almost unaffected, even in dangerous zones. Experiments in immunisation are to be carried out in connection with the toxicological work mentioned above.

REH (L.). **Schweflige Säure, Blausäure, Zyklon.** [Sulphurous Acid Gas, Hydrocyanic Acid Gas, and Zyklon.]—*Der Praktische Desinfektor, Dresden,* xiii, no. 5, May 1921, pp. 35–37. [Received 5th August 1921.]

From a careful study of sulphurous acid gas, Zyklon, and hydrocyanic acid gas the author states that the last-named is undoubtedly the most poisonous. Under equal conditions one volume of it per cent. kills most living creatures in one to two hours, whereas Zyklon requires two volumes and six hours, and sulphurous acid 1½–2 volumes and 24 hours. Its penetrative power is greater than that of either of the others, as it is lighter than them and than air. It is also the least injurious to metals, fabrics, etc.; only living plants and moist or oily food-stuffs require to be removed from its influence. It is, however, much less convenient to use than the others, especially as regards disposal of residues. Its volatile nature permits of rapid airing, so that the total time required for all fumigation operations is shorter than with the other two gases. As regards cost no reliable estimate can be made until the present monopoly prices are done away with in Germany.

Lange (—). **Versüche über die Verwendbarkeit des Holzessigs als Ersatz für den Sabadillaessig bei der Läusebekämpfung.** [Experiments on the Use of Wood Vinegar as a Substitute for Sabadilla Vinegar in combating Lice.]—*Arb. Reichsgesundheitsamt, Berlin,* xcii, no. 3. (Abstract in *Der Praktische Desinfektor, Dresden,* xiii, no. 5, May 1921, pp. 38–39.) [Received 5th August 1921.]

Both wood vinegar and sabadilla vinegar have about the same content of acetic acid. In the former the action of the acid is supplemented by that of other distillation products, especially by that of tar constituents (perhaps also methyl alcohol or acetone). In sabadilla vinegar an almost specific action is ensured by its alkaloids. The action of the two vinegars is therefore different, but the dissimilarity (consisting in a greater toxicity of sabadilla) is limited to a short period of action quite inadequate in practice. If the period is such as obtains in ordinary practical work, both vinegars produce the same satisfactory final result, and as wood vinegar has been found to have no irritant effect on the skin, it provides a good substitute for sabadilla vinegar in the destruction of lice and their eggs.

Diffloth (P.). **La Mouche des Etables.** [*Stomoxys calcitrans.*]—*La Vie Agric. & Rur., Paris,* xix, no. 32, 6th August 1921, pp. 101–104, 3 figs.

In moist seasons, generally during August and September, considerable harm is done to horses and cattle by the attacks of the stable-fly, *Stomoxys calcitrans.* The life-history of the fly and its habits are described. Natural enemies include poultry, Carabids, wasps, spiders, and the parasitic Hymenopteron, *Spalangia muscidarum.*

Various remedies against the fly are suggested. One of the best dressings for animals consists of 1 gal. fish oil, ¼ lb. coal-tar oil and 1 pint of kerosene ; but it is preferable to protect the animal by means of a cloth covering. The mane and tail, which are a horse's natural means of defence, should not be cut. It is advisable to screen all doors and windows of stables with fine wire gauze, and animals should be brushed down before being returned to the stable. Sheep and pigs are not so severely attacked, and can easily keep themselves free from the flies if provided with a slope or trench, which is more efficacious if sprinkled with paraffin. Two furrows of a plough are quite sufficient.

A trap for the flies consists of a wooden frame exactly fitting the only opening in a stable, preferably on the sunny side. There is a slit about half an inch wide and occupying the whole width of the frame at its base. Flies entering this opening find themselves under a fine mesh net at an acute angle and having in its upper part holes large enough for them to pass through. This arrangement can be repeated several times, so that the flies pass to various levels and in all directions. If a bait be put into the trap it will also attract the house-fly [*Musca domestica*], but for *S. calcitrans* the odour of the animals is sufficient.

For destruction of the larvae, which breed chiefly in rotting straw, all straw stacks, particularly oat stubble, should be carefully piled on a clean floor so that they will not become damp. Any unusable stubble should at once be removed. As manure-heaps also serve as breeding-places, all litter should be removed from stables at least once every three days, and the surface of manure heaps should be constantly moved in order to expose the larvae to air, sun, and their natural enemies.

Grassi (B.). **Osservazioni sulla Biologia degli Anofeli.** [Observations on the Biology of Anophelines.]—*Ann. d' Igiene, Rome,* xxxi, no. 6, June 1921, pp. 329–349. [Received 8th August 1921.]

The term "hibernating" may be rightly applied to Anophelines that are fat and do not contain blood, and the author believes that the females emerging in the environs of Rome in late autumn (at the first onset of cold weather) suck blood after being fertilised and digest it; the eggs, however, remain small in size and the mosquitos become fat. The intestines of fat individuals are empty, and no success attended repeated attempts to make these mosquitos bite. It is not known whether more than one meal is needed to ensure fattening. In the Roman climate only a limited number of individuals become fat. They have to remain in surroundings that are not warm enough to cause the ingested blood to be used for maturing the eggs. In the last months of the year the appearance of fresh fat individuals is always possible.

It may be thought that fattening is an annual occurrence in the life of the species independent of temperature. In this connection the author thinks it possible that in late autumn Anophelines can fatten when the surrounding temperature is, on the whole, warmer than in spring, at which latter season the maturing of eggs takes the place of fattening. This is quite probable and may be explained by assuming that in spring Anophelines prefer—to a greater degree than in autumn—warm situations promoting the maturing of eggs instead of fattening It is, however, certain that hibernation is not a necessary link in the continuation of the species. Some individuals with developing or mature eggs may be found contemporaneously with fat specimens. At the beginning of winter Anophelines that contain no blood and are thin may be found. Some of them have emerged recently, and others have been fat and have become thin once more.

The spring awakening of Anophelines is doubtless connected with loss of fat. Individuals that have suffered such a loss leave their refuges and assemble in the sheds of domestic animals. In Anophelines that have lost fat the eggs are always in the backward condition they were in before fattening and they do not grow in size unless blood is taken. An Anopheline that has hibernated (*i.e.*, lost fat) can mature its eggs as the result of one blood-feed; the author does not believe this to be exceptional. It is certain that at least some of the first individuals that mature at the end of winter have a smaller abdomen than others and produce a smaller number of eggs.

The above data apply to *Anopheles maculipennis* (*claviger*), but *A. bifurcatus* exhibits similar phenomena.

It is possible that the malaria epidemics that occur in spring in northern countries may be related to the awakening of Anophelines (that have hibernated, *i.e.*, lost fat) containing sporozoits in the salivary glands. This is important because Anophelines that are not fat may in the course of the winter suck blood, fruit or water, and thus cleanse themselves, whereas fat specimens do not feed at all.

As regards the entry into and exit from buildings it appears that these movements coincide with the variation in sunrise and sunset. Further research is necessary on this point. All the facts detailed here yield the result that Anophelines with mature eggs, unfed and unfertilised females, and males issue for the most part from their shelters in the evening before nightfall ; a few do so before daybreak. The shelters are entered partly in the evening before night and partly in the morning before full daylight. The number entering in the morning is much larger than that in the evening. The Anophelines that enter are males, unfed females that have not yet been fertilised, or females that have produced eggs. Entrance may also occur, though only in a small degree, during the night or even by day.

The exit of the Anophelines has evidently two objects, one being to provide an opportunity for the fertilisation of the females, and the other to provide an opportunity for oviposition by mature individuals.

The entrance likewise has two objects, one the desire for a temporary shelter on the part of newly emerged males and of females awaiting a suitable time (sunset) for mating in the open, and the other, the desire of fertilised females to suck blood and to shelter in order to digest their food and mature the eggs.

Other experiments show the incorrectness of the opinion that Anophelines feed daily and that they daily leave their shelters for the open air. This is of importance in connection with the spread of malaria.

Miller (D.). **Sheep Maggot-flies and their Allies.**—*N.Z. Jl. Agric., Wellington,* xxii, no. 6, 20th June 1921, pp 321–334, 17 figs.

This paper is a preliminary review of several species of maggot-flies collected in New Zealand. Their principal characters are given, together with their life-history, and nature of the damage caused to sheep.

There are at least 15 species in New Zealand. The only indigenous ones are *Calliphora quadrimaculata,* Swed., *C. hortona,* Wlk., *C. icela,* Wlk., and *Pyrellia antennatis,* Hutton. Short descriptions of each insect are given, and the local information regarding specimens forwarded by sheep owners is tabulated. The most important wool-blowing flies in New Zealand are *Pollenia stygia* and *Lucilia sericata,* and in Australia *P. stygia* and *Chrysomyia* (*Pycnosoma*) *rufifacies.* The larvae of the latter resemble those of *Fannia canicularis,* but its presence in New Zealand is doubtful.

Bluebottles have been reported as attacking sheep, but only *C. hortona* has been bred from wool. The others have not yet been identified, but it is thought that *C. erythrocephala* and *C. quadrimaculata* on rare occasions infest sheep, especially if they are dirty. Spinose maggots have been found infesting wool and burrowing into the skin, but attempts to rear the adults were unsuccessful. They may have been *F. canicularis* or *Chrysomyia rufifacies.*

Lambs suffer most from maggot-flies, and ewe lambs more than wethers. Flies are attracted by blood at docking time and have also been known to strike round a ram's horns. Dirty sheep are usually attacked, but clean sheep may be blown at the shoulders. Decaying feet in foot-rot, dog-bites and other wounds are also blown. In some parts the flies are active throughout the winter. They are more troublesome in sheltered places and in moist and hot seasons. Blowing continues through December till the autumn, though where sheep are clean after shearing, January and February may be periods of immunity. In Australia, where wool-blowing has greatly increased of recent years, clean wool is now often infested.

The chief remedial measures have been crutching, arsenical dips, and shearing of lambs. The control experiments described here as carried out in Australia have already been noticed [*R. A. E.*, B, vii, 114]. Destruction of the carcases of animals, in which the flies normally breed, by burning or burying is important. The utility of parasites as a means of control is uncertain. No definite results have been obtained from the introduction from Australia of *Chalcis calliphorae.*

FERGUSON (E. W.). **New Australian Tabanidae, with Notes on previously described Species.**—*Proc. R. Soc. Victoria, Melbourne,* N.S., xxxiii, 1921, separate, 29 pp., 2 plates, 3 figs.

The new species described are:—*Pelecorhynchus flavipennis*; *Erephopsis clelandi,* found biting horses; *E. subcontigua*; *E. rufoniger*; *E. xanthopilis*; *Parasilvius fulvus,* gen. et sp. n.; *Ectenopsis* (?) *victoriensis*; *Silvius sulcifrons*; *S. nigroapicalis*; *Tabanus latifrons*; *T. tasmanicus*; *T. bassii*; *T. dixoni* and *T. diemanensis.*

BRUES (C. T.). **Insects and Human Welfare. An Account of the More Important Relations of Insects to the Health of Man, to Agriculture, and to Forestry.**—*Cambridge, Mass.,* Harvard Univ. Press; and *London,* Humphrey Milford, 1920, xii+104 pp., 42 figs. Price $2.50. [Received 27th September 1921.]

This volume presents some of the principles and practices of applied entomology in a form illustrative of the biological relationships of insects to their environment; but few of the details to be found in various other, larger, and more or less encyclopaedic treatises are included, and matters not directly necessary for a brief consideration of insects as they effect human welfare are avoided.

Our present knowledge regarding the insect dissemination of such diseases as malaria, yellow fever, sleeping sickness, typhus, trench fever and bubonic plague is summarised in a chapter on "Insects and the Public Health," and several of the insects concerned, as well as others, receive attention in one devoted to "Household Insects."

The biological method of reducing the numbers of noxious insects offers, at present, the most promising field in which to speculate concerning the future development of entomological practice, to which the concluding chapter is devoted.

ISMERT (R.). **Les Maladies du Sang: Les Piroplasmoses.**—*Rev. Agric. Afr. Nord, Algiers,* xix, no. 105, 5th August 1921, pp. 612–613.

A general account is given of piroplasmosis and of its economic importance, especially in the plains, where it causes the death of many animals. In a later paper, the modes of infection and the exact rôle of ticks in the transmission of the disease will be discussed.

SERGENT (Et. & Ed.). **Etude Expérimentale du Paludisme.**—*Arch. Inst. Pasteur Afr. Nord, Algiers,* i, no. 1, March 1921, pp. 1–32. [Received 8th August 1921.]

In the course of this description of the effect of quinine and other drugs on *Plasmodium relictum,* which is the causal agent of malaria in birds, it is stated that, at a temperature of 77° to 85° F., there is a period of incubation lasting from 12 to 15 days during which the parasite is present in the form of zygotes encysted in the wall of the stomach of the mosquito (*Culex pipiens*), before the sporozoits appear.

SERGENT (Et.). **Existence de** *Leptomonas davidi* **dans le Latex d'Euphorbiacées d'Algérie** (*E. peploïdes*).—*Arch. Inst. Pasteur Afr. Nord, Algiers*, i, no. 1, March 1921, p. 58. [Received 8th August 1921.]

A search has been carried on for some years for Lafont's flagellate in the latex of several hundreds of Euphorbiaceae in Algeria, especially *Euphorbia peplus*, *E. peploïdes* and *E. helioscopia*. The investigations were generally made in the spring, when *Euphorbia* was abundant, and only on one occasion were protozoa found in May, in the latex of *E. peploïdes*. This is the first time that *Leptomonas davidi* has been recorded in northern Africa, and apparently its first record from the latex of this species [*cf. R.A.E.*, B, ix, 154].

SERGENT (Et.) & GOUILLON (P.). **Essais d'Inoculation à un Singe d'une Filariose humaine par des Piqures de** *Culex pipiens*.—*Arch. Inst. Pasteur Afr. Nord, Algiers*, i, no. 1, March 1921, p. 85. [Received 8th August 1921.]

On 22nd November 1919, more than 100 individuals of *Culex pipiens* were fed on a Senegalese who was known to harbour embryos of *Acanthocheilonema* (*Filaria*) *perstans*, the insects being removed immediately afterwards to an incubator heated to 75 to 77° F. After two months they were fed on a monkey (*Macacus sinicus*). The result was negative in spite of the fact that examination was continued for eight months. Microscopic examination of the thoracic and cephalic content of 20 individuals of *Culex* fed on blood infected with *A. perstans* revealed no filariae.

Only one case of filariasis contracted in Algeria has as yet been recorded (in 1908), but, particularly since the war, thousands of natives harbouring embryonic filariae have travelled about Algeria.

PARROT (L.). **Sur l'Armure génitale des Phlébotomes du Groupe** *minutus*, **Rondani, et sur** *Phlebotomus fallax*, **nov. sp.**—*Arch. Inst. Pasteur Afr. Nord, Algiers*, i, no. 1, March 1921, pp. 99–102, 1 fig.

This systematic paper discusses the reasons, based on the genital armature, for giving *Phlebotomus minutus*, Rond., var. *fallax*, Par. [*R.A.E.*, B, ix, 95] the status of a species.

FRANÇA (C.). **Sur un Cas de Nanisme chez** *Phlebotomus papatasii*, **Scop.**—*Arch. Inst. Pasteur Afr. Nord, Algiers*, i, no. 1, March 1921, pp. 103–106.

A dwarf individual of *P. papatasii*, Scop., is recorded from a number taken in Mesopotamia in 1916, and a table shows the relative measurements of individuals taken in Mesopotamia, Algeria and Salonica.

Kieffer (J. J.). **Sur quelques Diptères piqueurs de la Tribu des Ceratopogoninae.**—*Arch. Inst. Pasteur Afr. Nord, Algiers,* i, no. 1, March 1921, pp. 107–115, 6 figs.

A key is given to certain genera of Ceratopogoninae allied to *Leptoconops.* The species described include *Microconops vexans,* gen. et sp. n., *Tersesthes camelorum,* sp. n., and *Culicoides* (*Diplosella*) *sergenti,* subg., and sp. n., all taken on camels in Algeria; *Holoconops transversalis,* sp. n., from Tunis; and *Culicoides cordatus,* sp. n., from Courland.

Other new genera erected are *Lasiohelea,* for *Atrichopogon pilosipennis,* Kieff.; *Gymnohelea,* for *A. singularis,* Kieff., and *A. longiserra,* Kieff.; *Protersesthes* for *Tersesthes brasiliensis,* Lutz; and *Styloconops* for *Leptoconops albiventris,* Meij. (*spinosipes,* Kieff.).

Loughnan (W. F. M.). **Unclassified Fevers in Jamaica.**—*Jl. Trop. Med. & Hyg., London,* xxiv, no. 15, 1st August 1921, pp. 201–204.

The etiology of various unclassified fevers is unknown, but they are probably protozoal in origin. There are at least three types of such fevers in Jamaica, and these are here described. *Culicoides maculithorax* is the most common blood-sucking insect in the island. It is ubiquitous and may be a vector of sand-fly fever. *Simulium* has been found, but not where the fever is prevalent.

Laake (E. W.). **Distinguishing Characters of the Larval Stages of the Ox-Warbles** *Hypoderma bovis* **and** *Hypoderma lineatum,* **with Description of a new Larval Stage.**—*Jl. Agric. Res., Washington, D.C.,* xxi, no. 7, 1st July 1921, pp. 439–457, 24 figs.

The value of the posterior stigmal plates and other characters for differentiating the four known larval stages of *Hypoderma lineatum,* De Villiers, and *H. bovis,* DeG., is discussed, and a new larval stage of *H. lineatum* in the oesophagus of the host is described.

Van Saceghem (R.). **La Trypanosomiase du Ruanda.**—*Bull. Agric. Congo Belge, Brussels,* xii, no. 2, June 1921, pp. 294–302.

In an earlier paper [*R.A.E.,* B, v, 12] the author expressed the opinion that pathogenic trypanosomes can be transmitted in nature from one animal to another by blood-sucking Diptera other than *Glossina,* and this has subsequently been confirmed by other observers. A severe epizootic of trypanosomiasis has recently broken out in Ruanda, where the altitude in many districts is above 4,600 ft. and where *Glossina* does not occur. The disease, which was unknown there a few years ago, seems to have been introduced by the mules used by the troops in the war, and has spread throughout the region. The trypanosome is pathogenic to cattle, sheep, guinea-pigs and probably to equines, and investigation has shown that it is identical with *T. congolense-pecorum.* Though *Glossina* is absent, *Stomoxys* spp. occur at certain times in great numbers. Many of these flies that had recently fed on infected animals were examined, and living trypanosomes were easily found in the intestines of all of them. By the following day these had disappeared. The presence of these living trypanosomes proves that the salivary juice of *Stomoxys* is harmless to them, though repeated investigations have failed to reveal them in the proboscis. Experimental infection with *Stomoxys* is being tested.

Russ (V.) and others. **Studien über die Malaria in Niederösterreich.** [Studies on Malaria in Lower Austria.]— *Veröffentlichungen des Volksgesundheitsamtes, Vienna,* no. xiv, 1921, 39 pp.

This publication comprises five sections, of which four are noticed here. Of these the introductory notes, the section on the epidemiology of malaria in Lower Austria, and the concluding notes, are by Dr. Russ, whilst that dealing with the distribution of Anophelines is by Dr. Franz Maidl.

The fact that the collapse of the Austrian front occurred at the end of October 1918, when the malaria season was ended, permitted measures to be taken against an epidemic in 1919. These included the formation of a Malaria Sanitary Column, which comprised a medical and a zoological side. The latter carried out a system of Anopheline surveys from May 1919 onwards, the method usually followed being a search for larvae, adults being looked for in special cases only. Both the species found in Lower Austria, *A. maculipennis*, Mg. (*claviger*, F.) and *A. bifurcatus*, L., are recognised carriers of malaria.

A long list of infested localities is given. Definite Anopheline areas are the plains, such as the Vienna basin and the Danube valley. From these the mosquitos appear to have penetrated into the valleys of the smaller rivers and streams, and their distribution is practically universal, occurring wherever conditions are favourable. In several localities *A. maculipennis* and *A. bifurcatus* occurred together, with a general predominance of the former. Neither the plains nor the mountain valleys appear to favour either of them specially. Larvae were found in both stagnant and running water, as well as in waters that were both clean and foul.

They were less abundant away from villages and in uninhabited situations, probably owing to the lack of winter shelters. The adults are chiefly found in privies and in the shelters of domestic animals of all kinds, though cattle sheds adjoining horses' stables appear to be preferred to the latter. The date of appearance of the larvae depends principally on the temperature of the water. Floods and high water-levels destroy the larvae, and drought, involving the disappearance of breeding places, has a like result. In spring and summer larvae of various sizes occur together, and this explains why there is no distinct periodicity in the abundance of larvae and adults.

The epidemiological observations that were made lead to the conclusion that malaria in Lower Austria is not an exotic disease, but is even now one of long standing and somewhat rare occurrence.

As malaria carriers (chiefly from Italy and Albania, and nearly all cases of benign tertian or of a mixed infection of benign and malignant tertian—quartan being very rare) and Anophelines are abundant in Lower Austria, the absence of epidemics in 1919 and 1920 point to the absence of a third factor needed to complete the chain. This appears to be the climate, which seems to prevent either the union of the gametes or their development subsequent to union. Dr. Russ inclines to the opinion that this climatic factor was not peculiar to 1919 and 1920, but that the mean summer temperature is normally too cold.

A comprehensive system of malaria prophylaxis seems impossible under present conditions, nor does it appear necessary. Anti-mosquito work on a small scale should be supplemented by the cure or segregation of freshly-infected cases and of plasmodia-carriers.

BRUMPT (E.). **Comment améliorer notre Bétail colonial.** [How to improve our Colonial Cattle.]—*Rev. Hist. Nat. App., Paris,* Iière Partie, ii, no. 7, July 1921, pp. 205–216.

The danger incurred by the transportation of cattle from infected to non-infected areas is discussed with special reference to the occurrence of piroplasmosis, anaplasmosis and trypanosomiasis. The movement of cattle from one hot climate to another is particularly dangerous, and special care should be taken to prevent the introduction of African coast fever into Madagascar, as one of the ticks transmitting it, *Rhipicephalus simus,* is already present there. There is no danger of introducing fresh diseases into hot climates from regions to the north of 44° latitude; but all cattle intended for export from such regions should be immunised before embarkation.

WOLLMAN (E.). **Le Rôle des Mouches dans le Transport des Germes pathogènes étudié par la Méthode des Elevages aseptiques.**—*Ann. Inst. Pasteur, Paris,* xxxv, no. 7, July 1921, pp. 431–449, 3 figs.

This paper has already been noticed from another source [*R.A.E.*, B, ix, 71].

SWELLENGREBEL (N. H.). **De mannelijke Genitalien der Nederlandsch Indische Anophelinen.** [The Male Genitalia of Dutch East Indian Anophelines.]—*Tijdschr. Ent., The Hague,* lxiv, no. 1–2, 1st August 1921, pp. 36–45, 7 figs.

This paper is complementary to the list of Anophelines already noticed [*R.A.E.*, B, viii, 162] and deals with such male genitalia as have not been described by Christophers [*R.A.E.*, B, iv, 24] or of which the author's observations differ from those of Christophers. The latter's findings relating to *Anopheles subpictus* (*rossi*), *A. vagus* and *A. ludlowi* are compared with those of the author. The other species dealt with are *A. hyrcanus,* Pall. (*sinensis,* Wied.), *A. barbirostris,* Wulp, *A. albotaeniatus,* Theo., *A. umbrosus,* Theo., *A. aitkeni,* James, *A. immaculatus,* Theo. (previously recorded as *flavus,* Sw.), and *A. annulipes,* Wlk., var. *moluccensis,* Sw. A key is given to the known male genital characters of Dutch East Indian Anophelines, Christophers' description being used for *A. gigas, A. jamesi,* and *A. fuliginosus* var. *nivipes.*

MANETTI (C.). **Gli Allevamenti dell'Africa tropicale occidentale e le possibili Attività italiane nella Regione.** [Stock Breeding in Tropical West Africa and possible Italian Undertakings in that Region.]—*L'Agric. Colon., Florence,* xv, no. 8, August 1921, pp. 421–433.

This is the first portion of a review of the means adopted in tropical West Africa against various pests and diseases of stock, written with the object of deducing the principles to be observed by breeders in Italian Africa.

A list is given of the known forms of trypanosomiasis and their insect carriers from the tropical regions of the world.

FLU (P. C.). **Enkele epidemiologische Waarnemingen over Pest.** [Some epidemiological Observations on Plague.]—*Geneesk. Tijdschr. Ned.-Indië, Batavia,* lxii, no. 3, 1921, pp. 263–287.

Numerous epidemiological observations on rat-plague were made at Batavia and other places where an outbreak occurred in 1920.

Xenopsylla cheopis was found in storehouses, sometimes in important numbers. These fleas are to be found at all times, but especially when rat-plague is present. They are most abundant in stores containing goods attractive to rats, especially rice.

The importance of rice in the spread of plague has long been known in Java, but hitherto rats were considered to be chiefly responsible by being transported with their nests, which were supposed to be inside the rice-bags. The author found that if dead plague rats were seen in a rice-store it was sufficient to take up the flooring to find large numbers beneath in various stages of decomposition. Their fleas must attempt to escape and some of them infest the fabric of the bags, or work their way into the mass of rice. The weight of a pile of bags tends to force apart the threads of the fabric, so that entry is easy. It was found that individuals of *X. cheopis* do occur on the floor and among the stacked goods, having probably come from infested rats. They are able to remain at least three days in a gunny bag. Fleas are therefore quite as important as rats in the spread of plague. The author is indeed inclined to think them of greater importance, as living rats seldom harbour fleas infected with plague.

The prospects of an effective quarantine against plague are not promising in view of the author's research on the killing power of SO_2 on fleas in rice-bags. At present the most powerful weapon in plague quarantine is fumigation with this gas, but it appears that reliance solely on this method may be mistaken. It has been found that rice weevils are able to avoid the effects of sulphurous acid fumes or of steam at 60°C. [140°F.] by burrowing into the mass of the grain. When native dwellings are fumigated with sulphur dioxide, the fleas (which are more resistant to the fumes than are their rat-hosts) abandon the rats and burrow into the sand covering the floor.

Using hermetically sealed jars it was ascertained that if the enclosed air contained $\frac{1}{2}$ per cent. of SO_2, about 40 minutes elapsed before all the fleas within were motionless; on opening the jars two hours afterwards the fleas appeared to be dead. At a strength of 4 per cent. immobility ensued immediately.

In another test a pound of rice in a gunny bag was placed with about 100 fleas in a jar into which air containing $2\frac{1}{2}$ per cent. of SO_2 was introduced. After a few minutes all the visible fleas were motionless. The jar was opened two hours later, when a number of fleas were found alive beneath the bag and on its fabric. The rice was then spread out and all the weevils and other insects present were found to be alive.

These results do not inspire confidence in the method of burning sulphur in open containers with a view to destroying the ectoparasites of rats, though it is an excellent method of killing the rats themselves.

In experiments with Clayton gas on fleas on and in sacks of rice in a specially sealed native boat it was found that when 3 per cent. of SO_2 was registered at the inlet the strength at the outlet was less than 1 per mille. Further there is always some water at the bottom of such boats, beneath the planking carrying the cargo. The experiment showed that some of the fleas were not killed by the gas and that rice weevils are even more resistant than fleas, so that they provide a good control for experiments. The chances of escape for the fleas increase with the size of the hold and the dampness of the cargo.

Clayton gas however gives better results than any other substance except hydrocyanic acid gas, which does not injure the goods, acts more quickly, and is cheaper. Hydrocyanic acid gas may also be used for cargoes that are not attractive to rats, such as machinery—in a shipment of which fleas have been found. Experience has shown that plague may be introduced in such cargoes.

van Slooten (J.). **Mededeeling omtrent eenige Proeven tot het Ontratten van Goederenloodsen door Middel van Zwaveldioxyde in zwakke Concentratie.** [A Communication on some Tests in freeing Goods-sheds from Rats by Fumigation with weak Sulphur Dioxide.]—*Geneesk. Tijdschr. Ned.-Indië, Batavia,* lxii, no. 3, 1921, pp. 340–345.

During the outbreak of rat-plague at Tandjong-Priok in 1920, an experiment was made to ascertain whether sulphur dioxide could be used to drive rats into traps out of goods-sheds that did not admit of regular fumigation as they could not be sufficiently sealed. It had been noticed that animals try to avoid the fumes of SO_2 much too weak to prove fatal. During some of the experiments from 0·054 to 0·21 volumes of SO_2 per 1,000 of air were registered. Only some of a number of marked rats were found in the traps, and the conclusion reached is that SO_2, used at a weak concentration, is not effective in driving out rats under such circumstances.

Leon (N.). **A Case of Urethral Myiasis.**—*Jl. Parasitology, Urbana, Ill.,* vii, no. 4, June 1921, pp. 184–185.

A case of urethral myiasis from Rumania is recorded in which larvae of *Musca domestica* were the causal agent.

Campion (H.). **Some Dragonflies and their Prey—ii. With Remarks on the Identity of the Species of *Orthetrum* involved.**—*Ann. & Mag. Nat. Hist., London,* viii, no. 45, September 1921, pp. 240–245, 3 figs.

Among the dragonflies recorded from Nyasaland, *Orthetrum brachiale*, P. de B., and *O. chrysostigma*, Burm., are apparently the chief species preying on *Glossina morsitans*, Westw.

Williams (C. B.). **A Blood-sucking Thrips.**—*Entomologist, London,* liv, no. 698, July 1921, pp. 163–164.

A Phloethripid, probably *Trichothrips* sp., is recorded as biting man in Trinidad. In the subsequent number of this journal, p. 198, Mr. E. E. Green describes similar experiences in Ceylon, and suggests that the species concerned may be naturally a predatory one. It is conceivable that in time a habitually blood-sucking race of thrips may be evolved.

KING (H. H.). **The Fowl Tick** (*Argas persicus*, **Oken.**).—*Wellcome Trop. Res. Lab., Khartoum,* Ent. Bull. 16, July 1921, 6 pp.

A common poultry pest in the Anglo-Egyptian Sudan is the fowl tick (*Argas persicus*). It essentially attacks fowls, turkeys, ducks and geese, but it has been recorded as infesting pigeons, and in Persia is said to attack man. Its life-history and habits have already been noticed [*R.A.E.*, B, i, 23, 115; ii, 115]. In addition to causing ill health in fowls, it is the carrier of *Spirochaeta marchouxi*, the causal agent of fowl spirochaetosis.

Trapping is an effective remedial measure. Fowl houses made of mud brick should be sand plastered, the doors tarred and all crevices filled in. The floor should be of cement or rammed earth. The perches should be wooden, resting on iron brackets arising from the floor, or on wooden trestles. They should be easily detachable and have at least one deep crack. Nesting boxes should be of wood and should not touch the walls. Any larval ticks, after leaving their host, will hide in the cracks in the perches, or woodwork of the trestles, or the crevices of the nest boxes when the hens are broody. These perches and the other crevices should be thoroughly scalded once a week, and this should be continued even if no ticks are found. Scalding water alone should be used, as other substances may render the cracks unattractive as hiding places. Fowls should not be allowed to roost in trees or on walls. If the roofs become infested, spraying with paraffin is recommended. They should preferably be made of corrugated iron resting on iron bars, as these furnish no shelter for ticks.

MAZZÀCCARA (G.). **L'Estro equino** (*Gastrophilus equi*). [The Horse Bot.]—*Allevamenti, Palermo,* ii, no. 8, 1st August 1921, p. 238.

A brief account is given of the life-cycle of and injury done by *Gastrophilus intestinalis* (*equi*). Infested horses should be given daily four gelatine capsules each containing ½ oz. of carbon bisulphide. Such larvae as are expelled alive must be killed. The adult fly may be kept away from grazing animals by washing them with a solution of tobacco or other repellent.

Memorandum on the Cattle Industry of Southern Rhodesia, 1921. —*Rhodesia Agric. Jl., Salisbury,* xviii, no. 3, June 1921, pp. 237–314, 3 tables.

The general health conditions of cattle in Rhodesia are remarkably good compared with other countries. Cattle owners are more affected by the quarantine restrictions imposed for African coast fever than by actual losses of animals from the disease. From 1906–1919 inclusive the mortality from this disease was only 500 head a year. At present there is only one centre where deaths occur, and it is hoped to eradicate this disease entirely from the country.

Imported cattle suffer from redwater and gall-sickness, but preventive inoculation for these diseases is being improved. The blood parasites *Piroplasma bigeminum* and *Anaplasma marginale* are prevalent in all indigenous cattle, causing stunted growth as well as injury from the direct action of the disease. Ticks transmit the disease to imported cattle, the most virulent forms always attacking the better bred animals.

Compulsory weekly dipping of cattle is universal, except in a few remote localities. There are to-day 1,639 dipping tanks in Southern Rhodesia, or upwards of one to every thousand head of cattle.

NOTICES.

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METALNIKOW (S.) & GASCHEN (H.). **Immunité et Hypersensibilité chez la Chenille.**—*C. R. Hebdom. Acad. Sci., Paris,* clxxiii, no. 5, 1st August 1921, pp. 336–338.

The experiments here described show that larvae of *Galleria mellonella* become immunised against cholera infection within three hours after the injection of the vaccine [*cf. R.A.E.*, B, ix, 154]. Although the treated larvae are immune to the minimum fatal dose they appear to succumb more rapidly to larger doses than the untreated larvae.

These observations support the hypothesis that the anaphylactic shock is the result of a too rapid cellular reaction stimulated by immunisation.

KONSULOFF (S.). **Die Lebensbedingungen der Anophelinen in Bulgarien in Zusammenhang mit der Malariaverbreitung.** [The Bionomics of Anophelines in Bulgaria in connection with the Diffusion of Malaria.]—*Arch. Schiffs- u. Trop.-Hyg., Leipsic,* xxv, no. 8, August 1921, pp. 227–240.

Since the war malaria has increased to such an extent in Bulgaria that at the Malaria Conference, held at Sofia in October 1920, it was recognised as the most widely spread disease in the country, the epidemic of 1920 being more severe than any in the preceding twenty years.

The Bulgarian Anophelines are *Anopheles maculipennis*, Mg., *A. bifurcatus*, L., *A. hyrcanus*, Pall. (*Myzorhynchus pseudopictus*, Gr.), and *A. palestinensis*, Theo. (*Pyretophorus superpictus*, Gr.). The first-named is the most common and occurs in the plains and mountainous districts up to about 4,000 feet. *A. bifurcatus* is rare, a few specimens being occasionally found together with *A. maculipennis*. *A. hyrcanus* formerly occurred as a rare species in north-eastern Bulgaria, but latterly it has appeared in the rice-fields in the south. In the evening swarms of this species occur in the rice-fields, though it is never found in adjacent houses, where the ceilings may be covered with *A. maculipennis*. It probably plays a part in the infection in the open, which seems to be common in Bulgaria, where in summer the agricultural population are in the habit of sleeping out of doors. *A. palestinensis* occurs in the Struma region in south-west Bulgaria, the small, algae-containing pools in ravines being its preferred breeding-places. Its larvae may also be found in collections of water so small as to appear quite unsuitable for mosquitos. Neither in Bulgaria nor in Macedonia has the author ever seen the larvae of *A. palestinensis* in the ponds in the plains, which have a muddy bottom, contain much grass and are the preferred breeding-places of *A. maculipennis*. *A. palestinensis* breeds in standing or slow-moving water with a sand or rubble bottom. Though *A. maculipennis* prefers the waters described above, it does not entirely avoid the breeding-places of *A. palestinensis*.

The latter appears to play an important rôle in the transmission of malaria in the southern part of the Balkans, but it is remarkable that only small numbers of it are found indoors in districts where it occurs. Of two Bulgarian regiments, one quartered in a district infested with *A maculipennis* and the other in a district infested with *A. palestinensis*, the latter suffered more from malaria.

It would be interesting to know whether in Greece also malaria is more diffused in hilly districts lacking much stagnant water (*A. palestinensis* regions) than in marshy districts unsuitable to

A. palestinensis (*A. maculipennis* regions). Existing statistics by Savas on malaria in Crete and Greece show that the chief incidence of malaria occurs in districts with few or no swamps.

The abundance of Anophelines in Bulgaria is subject to marked annual variations due to the temperature in spring and to the amount of water in summer.

It is possible to differentiate zones where these variations occur in different degrees. These zones, where malaria epidemics are also subject to characteristic variations, are as follows:—(1) the neighbourhood of the big lakes along the Danube and Black Sea; (2) the neighbourhood of the big inland rivers that form large pools and swamps; (3) the neighbourhood of the rice-fields; (4) the plains without lakes or large rivers, where Anopheline breeding-places are small collections of water; (5) the hill country in the basin of the Struma and its tributaries, which is the region infested by *A. palestinensis*. In some years there is little malaria in all these zones, but in others there are important outbreaks in some of them.

In a normal year the females oviposit throughout April; owing to the low temperature development is slow, the adults emerging between mid-May and 1st June. Oviposition occurs again during the first three weeks in June, the adults emerging throughout July. A third generation appears from mid-August to mid-September, and there may be an exceptional fourth generation, which may be disregarded, as the malarial parasites do not develop in such mosquitos owing to the low autumn temperature. This sequence is not uniform in practice, and individuals of two generations may be contemporaneous. Development is also markedly modified by the available amount of water. The Bulgarian spring is rather wet, and all small collections of standing water contain enough to ensure development. The very dry Bulgarian summer causes all small collections to disappear in August, and conditions are unfavourable for the larvae of the third generation. This effect of drought is most marked in the plains.

A spring temperature that is much lower than usual and lasts a long time results in a great diminution of Anophelines in summer. This holds good for all zones and is due to retarded development and to the disinclination of females to suck blood until the advent of warm weather. In 1919 the eggs giving rise to the second generation began to be laid as late as the second half of June.

In the zones peculiar to *A. maculipennis* and *A. hyrcanus* the spring rain showers do not influence the abundance of Anophelines in summer, but rain showers in July and August are very much in their favour. In the *A. palestinensis* zones points of great importance are the number of showers and the consequent number of floods that sweep out the stream beds, and the incidence of these showers in spring and early summer. Floods at the end of April or early in May destroy most of the larvae of the first generation, so that few females are available to produce the second. Furthermore, if the interval between two floods is shorter than the length of the larval period such larvae as have hatched after the first flood will be destroyed by the second.

Bass (C. C.). **An Attempt to explain the greater Pathogenicity of** *Plasmodium falciparum* **as compared with other Species.**—*Amer. Jl. Trop. Med., Baltimore*, i, no. 1, January 1921, pp. 29–33. [Received 23rd August 1921.]

The most pathogenic of the three common species of malarial parasites, *Plasmodium vivax*, *P. malariae* and *P. praecox* (*falciparum*), is undoubtedly the latter. The theoretical explanation offered for this is that the shape of the parasite and the unyielding consistency of its substance results in its lodgment in the capillaries to a greater extent, and in that position larger numbers multiply and survive than in the case of the other species.

King (W. V.). U.S. Bur. Ent. **Natural Malaria Infection in** *Anopheles* **Mosquitoes.**—*Amer. Jl. Trop. Med., Baltimore,* i, no. 1, January 1921, pp. 35–39. [Received 23rd August 1921.]

In 1917 a series of examinations were made of Anophelines collected under natural conditions in Louisiana and Mississippi to determine the rate of infection in malarial regions. The results obtained at the end of the first season were not entirely complete, but 5,878 dissections and examinations were carried out, the species concerned being *Anopheles quadrimaculatus*, *A. crucians* and *A. punctipennis*. The first named was by far the most numerous (5,673 individuals), and 0·54 per cent. were infected, though only two were in the infective stage when captured. No examples of *A. crucians* or *A. punctipennis* were found infected.

Craig (C. F.). **The Classification and Differential Diagnosis of the Aestivo-Autumnal Malaria Plasmodia.**—*Amer. Jl. Trop. Med., Baltimore,* i, no. 2, March 1921, pp. 57–96, 6 charts, 3 plates. [Received 23rd August 1921.]

In 1909 the author proposed a separation of the two species of malarial parasites associated with aestivo-autumnal infection, and named the quotidian parasite, *Plasmodium falciparum quotidianum.*

The points of difference in the morphology and development of *P. praecox* (*falciparum*) and *P. praecox quotidianum,* as observed in the blood of man, are here described and summarised in tabular form. Their morphological differences are as constant and distinctive as those between *P. vivax* and *P. malariae,* while the striking difference in the temperature curves to which they give rise serves to differentiate them still further.

There is no direct experimental evidence that they are two distinct species, as there are no records of experimental production of quotidian aestivo-autumnal malaria by inoculating *P. praecox quotidianum* into susceptible individuals or through the bites of experimentally infected mosquitos. Successful experiments have been recorded, but the exact species of aestivo-autumnal malaria used was not ascertained, it being thought that only a single one was concerned.

The author considers that the evidence now given is almost sufficient to entitle *quotidianum* to full specific rank, but until this is actually proved, this organism should be regarded as a subspecies of *P. praecox.*

Sinton (J. A.). **Some Cases of Myiasis in India and Persia, with a Description of the Larvae causing the Lesions.**—*Indian Jl. Med. Res., Calcutta,* ix, no. 1, July 1921, pp. 132–162, 4 plates, 8 figs.

Previous records of myiasis are reviewed, and six cases from the author's personal observations in India are dealt with. These include nasal, buccal and cutaneous myiasis in man, and the latter also in a dog and camel. The flies concerned are *Chrysomyia* (*Pycnosoma*) *dux*, Esch., *Lucilia sericata*, Mg., *Sarcophaga ruficornis*, F., and *Wohlfahrtia* sp., the various stages of which are described.

A table distinguishing the larval and pupal characters is given, and the technique employed in removing the larvae and preparing them for identification is explained.

KOBAYASHI (H.). **Overwintering of Flies.**—*Japan Med. World, Tokyo*, i, no. 3, 15th July 1921, pp. 11–14.

In Korea, the adults of *Musca domestica*, chiefly the females, survive throughout the winter if fed. The flies are not in a state of hibernation, active movement and oviposition occurring at times.

Some authors maintain that living pupae are found in the winter, while others say it is impossible to keep them. The author's experiments in this connection show that in an ordinary room temperature the pupae emerge after a few weeks, while the larvae can hardly develop under these conditions. Experiments showed that the eggs are the least resistant to low temperatures, the larval and pupal stages being next, and the adults the most resistant. Outdoor temperatures prevent *M. domestica* from breeding in the winter. *Stomoxys calcitrans*, *Sarcophaga carnaria*, and *Fannia canicularis* hibernated in the larval and pupal stages at a room temperature.

Observations on adult flies under natural winter conditions are as follows:—In Seoul it is probable that there are certain places where *M. domestica* breeds continuously in the winter, but there are no exact data confirming the overwintering of larvae and pupae. *Scatophaga stercoraria* and *Calliphora lata* may overwinter in the adult stages. Larvae and pupae were collected in Keigo, and breeding experiments show that the following species overwinter in those stages: *Stomoxys calcitrans*, *Sarcophaga carnaria*, *Fannia canicularis*, *Sepsis* sp. and (?) *Ophyra nigra*.

VILLENEUVE (J.). **Description de Diptères nouveaux.**—*Ann. Soc. Ent. Belg., Brussels*, lxi, pt. 5–6, 1st July 1921, pp. 157–161.

The species described include *Haematopota* (*Chrysozona*) *lambi*, sp. n., from Beausset (Var). At Montpellier a variety of *H. bigoti*, Gob., is frequently met with, for which the author suggests the name var. *monspellensis*, n.

CLAPIER (P.). **Evolution et Etat actuel de la Trypanosomiase humaine dans le Secteur de Prophylaxie No. II (Moyen-Congo).**—*Bull. Soc. Path. Exot., Paris*, xiv, no. 7, 13th July 1921, pp. 405–423.

This is a study of the situation as regards sleeping sickness throughout the large region of the Middle Congo, and a general review of the present status of the disease on the lower Ubangi and its tributaries is given. It is not considered possible as yet to determine whether regular atoxyl prophylaxis, carried on in each zone for 16 or 18 months, can be said to have been successful.

DI DOMIZIO (G.). **Su due Tripanosomi del Bestiame nella Somalia Italiana.** [Two Trypanosomes in Cattle in Italian Somaliland.] —*Bull. Soc. Path. Exot., Paris*, xiv, no. 7, 13th July 1921, pp. 423–433, 2 figs.

After referring to the studies by Martoglio and by Croveri on trypanosomiases in Italian Somaliland [*R.A.E.*, B, vii, 189] the author describes his observations of numerous cases in bovines, equines and camels.

From the first, great morphological differences were visible between the trypanosome in bovines and that in equines. The bovine trypanosome belongs to the group including *Trypanosoma dimorphon, T. congolense, T. nanum* and *T. pecorum.* Unlike *T. nanum* it can be inoculated into small mammals, and it is probably identical with one of the three others. The cattle contract the disease on the banks of the Webi Shebeli and Juba rivers and in the adjacent lands covered with thick bush, where *Glossina pallidipes* occurs. The natives apply the name " ghindi " to this fly and to the trypanosome or trypanosomes conveyed by it.

The trypanosome observed in equines has a marked dimorphism that brings it into the *brucei-pecaudi* group ; it is not certain whether it is *T. brucei* or *T. pecaudi,* or a variety of one of these.

T. somalilense and *T. cellii,* described by Martoglio in 1911 as the respective agents of " ghindi " and " gobiat," do not exist. Each of these is a plural species resulting from a mixture of the two trypanosomes described here, with perhaps the further admixture of a third, such as a pathogenic species quite recently observed in cattle by the author, who refers it to the type of *T. cazalboui.*

Sergent (Ed.). **Sur l'Hypothèse de l'Evolution des** *Sarcocystis* **du Boeuf chez un Insecte hématophage, Hôte définitif.**—*C.R. Soc. Biol., Paris,* lxxxv, no. 27, 23rd July 1921, pp. 408–411.

Microscopical examination of the blood of a calf, taken from the cheek, showed the presence of spores of *Sarcocystis,* although previous and subsequent weekly examinations of blood from the same region proved negative. The observations here described show that it is possible for insects such as Tabanids or *Stomoxys* to ingest large numbers of these spores at one feed. The spores are dimorphic, some having the characters and elements of males and others those of females. This supports the theory of previous authors that insects may prove to be alternative hosts of this organism.

Sergent (Et. & Ed.). **Formes Leishmaniennes et Leptomonadiennes chez les Punaises de Chauves-Souris.**—*C. R. Soc. Biol., Paris,* lxxxv, no. 27, 23rd July 1921, pp. 413–415, 1 fig.

A *Leptomonas* and another leishmaniform organism have been isolated from the blood of *Cimex pipistrelli,* Jenyns, taken from bats in the department of Oran. It remains to be seen whether these organisms and the trypanosomes of bats in Algeria are allied. Attention is drawn to the recent discovery of *Schizotrypanum* in bats in Alsace [*R.A.E.*, B, ix, 120].

Swezey (O. H.). **Ox Bot-fly or Warble Fly,** *Hypoderma lineata.*—*Hawaiian Planters' Record, Honolulu,* xxv, no. 1, July 1921, pp. 23–25, 6 figs.

The presence of *Hypoderma lineatum* (warble-fly) on cows in the Island of Kanai is recorded. These animals had been imported from the mainland some few months previously, and were doubtless infested before they were shipped. Although the same thing has probably occurred before, the fly does not seem to have become established in the island. The life-history and habits of this pest as occurring in the United States are described. If the fly should become established in the Hawaiian Islands, it is thought that the life-cycle might be shortened and that development might be continuous as in the case of the house-fly [*Musca domestica*] and horn-fly [*Lyperosia*]. Warbles found on imported cattle should be destroyed either by removing them by pressure or by rubbing into the affected parts of the hide a little kerosene or mercurial ointment.

Babcock (O. G.). U.S. Bur. Ent. & Bennett (D. H.). **The Screw Worm and the Wool Maggot.**—*Texas Agric. Expt. Sta., College Station,* Circ. 27, April 1921, 15 pp., 7 figs. [Received 31st August 1921.]

Cattle in Texas suffer considerably from the attacks of *Cochliomyia* (*Chrysomyia*) *macellaria*, F. (screw-worm fly), which is said to cause an annual loss of at least £800,000 in the United States alone. The life-history and habits of the fly are described [*R. A. E.*, B, vi, 148–150]. The method of dispersion is by flight, marked flies having been known to travel at least 15 miles. Several days of warm weather, with a maximum temperature of about 80° F. are necessary before oviposition takes place, this seldom occurring before May. Warm, showery weather favours breeding, which ceases about the middle of December.

Clean sanitation and the immediate destruction of all carcasses is one of the best measures for preventing the increase of the fly. A carcass should be completely burnt by placing it on a pile of wood, or by digging a trench about a foot deep, filling it with wood and rolling the animal on to the pile. It is questionable whether vultures and other scavengers are of much use in this connection; in any case they do not destroy carcasses sufficiently to prevent breeding of the flies.

Various methods of poisoning the flies have been tried. Carcasses have been partly skinned, and the exposed flesh slashed and treated with a solution of 1 lb. white arsenic in 5 U.S. gals. of boiling water. A more successful method is to kill a goat or sheep, skin and partly gut it and suspend it from a tree, with the head, neck and shoulders in a tub containing such a poison as 4 liquid oz. sodium arsenite or 1 or 1½ U.S. gals. of arsenical dip mixed with 7 to 10 U.S. gals. of water. Both screw-worm flies and blow-flies are attracted to the bait, and most of them sip some of the poison before leaving. These baits, however, do not remain attractive for more than a week or ten days.

A trap that has given much success consists of a cylinder of wire gauze 24 in. high and 18 in. in diameter, with a screened top and, at the bottom, a cone 22 in. high, with a 1½ in. opening at the top. This trap is set on a platform and placed in a tree, somewhere along a stream or water-hole, where the flies seem to congregate, at about 4 or 5 ft. above ground and in the shade. The bait may be a rabbit cut open and placed in the bait-pan, meat of any kind, entrails of animals, or, best of all, a large rattlesnake. Dried gut slime, using about 6 oz. to 2 quarts of water, seems a promising bait. Trapping and poisoning alone, however, are not dependable methods without systematic destruction of carcasses.

The prevention of wounds or raw places on animals is of the greatest importance, and when they occur they should be protected from infestation. When maggots are already present, they should first be killed with the stock chloroform and then removed from the wound before the repellent dressing is applied. The following are successful repellents :—A powder consisting of 80 parts (by weight) powdered alum, 60 parts zinc oxide, 30 parts powdered boric acid and 6 parts gum camphor ; or a powder of 5 parts gum camphor, 100 parts powdered charcoal, 50 parts laundry starch, 10 parts boric acid and 10 parts tannic acid. An efficient liquid repellent is composed of 1 quart each of pine tar and machine oil, and 1 lb. chloroform (U.S.P.) and 4 oz. gum camphor. When required, one part of the chloroform mixture should be used with four parts of the oil mixture. Other formulae are 4 oz. pine tar, 6 oz. castor oil, 10 oz. kerosene oil and 1 oz. turpentine ; or, 20 oz. pine tar, 10 oz. glycerine and 1 oz. turpentine.

Practices in range management that tend to prevent outbreaks of screw-worm cases are discussed, such as suitable fencing, the best season for breeding stock, and for dehorning cattle, and the avoidance of overstocking.

Euphormia (*Phormia*) *regina*, Meig. (black blow-fly or wool maggot) is the real wool-maggot fly of Texas. It seldom appears before October and increases throughout November. During cold weather it is not active, but quickly appears on warm days in January and February. To reduce its numbers, dehorned cattle should have a pine-tar dressing or a good dusting powder applied to the wound. The burning of carcasses and the use of traps for *C. macellaria* will also destroy many of the blow-flies.

Bennett (D. H.). **Internal Parasites affecting Sheep and Goats.**—*Texas Agric. Expt. Sta., College Station,* Circ. 28, April 1921, 16 pp., 9 figs. [Received 31st August 1921.]

The sheep bot (*Oestrus ovis*) deposits larvae in the nostrils of sheep and goats, the greatest infestation occurring during the hot periods of the year, but also taking place on warm days in late autumn, winter and early spring. During fly attacks sheep stand huddled in the shade, protecting their noses either in the grass or under other sheep.

The most pronounced symptoms are seen when the larvae work their way to the upper air passages of the head and horns. During this time a mucous nasal discharge is seen. This stage generally occurs in the summer or early autumn. In about 6–8 weeks the larvae become stationary, and the secretion decreases ; when mature, they descend to bury themselves in the ground to pupate. Practically the same symptoms may be seen during the descent as during the invasion.

No safe remedy has yet been found, as one strong enough to kill the larvae would probably kill the animal through irritation of the mucous membrane. The following method is recommended :—A plank with holes bored at intervals should be placed over a salt trough. The salt should be kept at such a level that the nose of the animal, when licking it, must touch the edge of the holes. The entire surface of these holes should be smeared once every three days with 1 pint white pine tar to 2 oz. oil of eucalyptus. Larvae deposited in this mixture smeared on the animal's nose usually die. The mixture may also be smeared with a brush on the nose and adjacent parts at least every week or ten days. The latter method is practicable only for young animals or registered stock.

ENDERLEIN (G.). **Neue paläarktische Simuliiden.** [New Palaearctic Simuliids.]—*Sitzungsber. Ges. naturf. Freunde, Berlin*, October–December 1920, no. 8–10, June 1921, pp. 212–224. [Received 29th August 1921.]

Descriptions are given of the following new Simuliids (arranged under numerous subgenera) :—*Simulium augustifrons*, from France, *S. tristigatum*, from France and Spain, *S. bulgaricum*, from Bulgaria, *S. lapponicum*, from Lapland, *S. heymonsi*, from Norway and Finland, *S. trabeatum*, from Italy, *S. jalcula*, from Germany and England (of which *S. angustitarsis*, Edw., nec Lundstr., is said to be a synonym), *S. dahlgrüni*, from Sardinia, *S. tömösvaryi*, from Germany, *S. matthiesseni*, from Germany and South Russia, *S. peetsi*, from Germany, *S. specularifrons*, from Norway, *S. wilhelmianum*, from Germany, *S. angustimanus*, from Germany, *S. latimanus*, from Germany and England, *S. schönbaueri*, from Hungary, *S. heidenreichi*, from Germany. *S. alternans* from Hungary, *S. parvum*, *S. montanum*, from Germany, *S. tenuifrons*, from Germany, *S. tenuimanus*, from Germany and Finland, *S. transcaspicum*, from Transcaspia, and *S. ochrescentipes*.

STEMPELL (W.). **Ueber das Vorkommen von *Anopheles* im Bezirke des früheren VII Armeekorps (hauptsächlich Westfalen).** [The Occurrence of *Anopheles* in the District of the former 7th Army Corps (chiefly Westphalia).]—*Mitt. Zool. Inst. Westf. Wilhelms-Univ., Münster i. W.*, no. 3, 5th August 1921, pp. 13–19, 1 fig.

Collections made from 13th August to 29th October 1918, in 45 localities, showed that Anophelines occur everywhere—in some places abundantly. *Anopheles maculipennis* was the most common, *A. bifurcatus* being half as numerous, while *A. plumbeus* (*nigripes*) was found at Dortmund only.

KREISEL (C.). **Ueber den Einfluss von Sauerstoff, Kohlensäure und Neutralsalzen auf Culiciden-Larven und -Puppen.** [The Influence of Oxygen, Carbonic Acid and Neutral Salts on Culicid Larvae and Pupae.]—*Mitt. Zool. Inst. Westf. Wilhelms-Univ., Münster i. W.*, no. 3, 5th August 1921, pp. 26–30.

In further tests of the effect of neutral salts—the chlorides, nitrates and sulphates of sodium, potassium, calcium and magnesium—on the tracheal system of Culicid larvae [*R. A. E.*, B, vii, 49; viii, 117], *Culex pipiens*, L., *Theobaldia annulata*, Schr., and *Anopheles maculipennis*, Meig., were the mosquitos used. In this connection it is noted that newly-hatched larvae of *C. pipiens* were taken at the end of December, showing that this species can hibernate in this stage.

The first experiments were made with larvae and pupae of *C. pipiens* placed in salt solutions in specimen glasses exposed to the air. The mortality of the larvae amounted to 80 per cent., as against 25 per cent. for the pupae, the higher figure being due to absorption through both mouth and anus, whereas in the pupae only the skin is involved.

In experiments in which pupae of *C. pipiens* were submerged in pipe-borne water with a normal gas content, in distilled water with a high content of CO_2 or O_2, and in solutions of neutral salts, it was found that their age was immaterial. In pipe-borne water with a normal gas content the length of life depends on the length of the tubes containing the liquid—all being of the same diameter—and was 80 minutes with tubes about 24 in. long and 40 minutes with tubes of about 11 in. These tests prove the dependence of the pupae on the amount of oxygen dissolved in the submersion medium and, therefore, the fact of respiration through the skin. In spite of this, submersion causes the pupae to die more quickly than the larvae owing to lack of intestinal respiration and because they have a greater need for oxygen, which Weinland believes to be connected with the building up of fat during pupation.

In water containing much CO_2 (0·8 gm. per litre), gas bubbles appear at the tips of the pupal spiracles and are slowly reabsorbed by the liquid. In this respect the pupae differ from the larvae ; Koch found no bubble production in the latter.

The length of life when submerged in salt solutions is shorter than in pipe-borne water. The most marked effect of salts on larvae submerged in them was the production and delivery of gas bubbles at the abdominal spiracles in the case of *C. pipiens* and *T. annulata*. This was not seen in Anopheline larvae. The number of bubbles varies with the composition and concentration of the fluid. Nitrates were the most active ; these were followed by the chlorides and then by the sulphates. Among the latter, magnesium sulphate was an exception, behaving like the nitrates. Gas bubbles may be produced by solutions weaker than those causing death. The bubbles must consist of used air, *i.e.*, CO_2, perhaps mixed with nitrogen from atmospheric air. The mechanism of this carbonic acid excretion is discussed.

No bubbles are formed or delivered in the case of Anophelines, because the body-wall is highly permeable to this gas. Larvae of *Culex* and *Theobaldia*, especially in the older stages, show gas bubbles in salt solutions, but not in water free from salts or in water rich in CO_2. Under normal conditions intestinal respiration probably suffices for excreting the gas.

As there is no reason to think that under normal conditions the excretion of CO_2 takes place in a different manner, these data should apply to Culicid larvae under all natural conditions except when a moult is imminent, when part of the carbonic acid must be eliminated through the spiracles.

The pupae of *Culex* behave in the same manner as the larvae of *Anopheles*. No gas bubbles are given off in salt solutions, but bubble formation and delivery occurs in water rich in CO_2.

KOCH (A.). **Die Atmung der Culiciden-Larven. Weitere Studien an** *Mochlonyx velutina* **(Ruthe).** [The Respiration of Culicid Larvae. Further Studies on *M. velutinus*.]—*Mitt. Zool. Inst. Westf. Wilhelms-Univ., Münster i. W.*, no. 3, 5th August 1921, pp. 31–41.

These studies on the larvae and pupae of *Mochlonyx velutinus*, Ruthe, continue experiments already noticed [*R. A. E.*, B, viii, 118]. The salts were the same as those used in the preceding paper. Sodium chloride was found to have the most injurious effect, and evidence was obtained that light is injurious to both larvae and pupae.

PILLERS (A. W. N.). **Sarcoptic Scabies (or Itch) in the Chimpanzee.**—*Vet. Jl. London*, lxxvii, no. 9, September 1921, pp. 329–333, 3 figs.

There appears to be no previous record in existing literature of scabies in the chimpanzee. Many of these animals imported from

West Africa are affected with a skin disease that yields to treatment with sulphur ointment. Attendants may become infested on their arms, but when the animal is cured the symptoms soon disappear. The position and extent of the lesions on an animal that was only examined after death are described, and in this case a species of *Sarcoptes* was found. A table is given showing the measurements of the various stages of the parasite.

Stadtmann-Averfeld (H.). **Uebersicht über die Morphologie der vier Larvenstadien einiger Culiciden.** [A Survey of the Morphology of the four larval Stages of some Culicidae.]—*Mitt. Zool. Inst. Westf. Wilhelms-Univ., Münster i. W.*, no. 3, 5th August 1921, pp. 42–43.

Details are given of the morphology of the four larval stages of *Culex pipiens*, L., *Theobaldia annulata*, Schr., *Aëdes diversus*, Theo., and *Mochlonyx* (*Corethra*) *velutinus*, Ruthe.

Hegh (E.). **Les Moustiques. Moeurs et Moyens de Destruction.**—*Brussels*, Imprimerie Industrielle & Financière, 1921, 239 pp., 105 figs. Price 12 Francs.

This is a second edition, revised and brought up to date, of the author's previous work [*R.A.E.*, B, vi, 161]. The arrangement of the text remains unaltered, but slight modifications and additional information increase the original 200 pages to 239. This edition should be of even greater value to residents in Africa than the former one.

Lawrence (H.). **The Pathogenicity of the** *Demodex* **(Owen) in the Human Being.**—*Med. Jl. Australia, Sydney*, 8th Year, ii, no. 3, 16th July 1921, pp. 39–40.

Several cases of skin eruptions due to *Demodex* are recorded that are considered to support the view that the presence of this parasite in man may have a definite pathological significance. Further microscopical study may decide whether the parasites concerned are really all varieties of *D. folliculorum*, or some acquired *Demodex* such as that found in the skin of the dog.

Headlee (T. J.) & Beckwith (C. S.). **Sprinkling Sewage Filter Fly,** *Psychoda alternata*, **Say.**—*Rept. New Jersey Agric. Expt. Sta., 1917–18, New Brunswick, N.J.*, 1919, pp. 214–221, 3 tables. [Received 6th September 1921.]

This paper is practically identical with one that has already been noticed [*R.A.E.*, B, vii, 24]. Haseman's description of the adult fly is quoted.

Headlee (T. J.). **Report on Mosquito Work.**—*Rept. New Jersey Agric. Expt. Sta., 1917–18, New Brunswick, N.J.*, 1919, pp. 243–245 and 292–295. [Received 6th September 1921.]

Particulars of the drainage operations carried out in various areas and shipyards and an outline of future plans for mosquito control are given. The mosquitos observed during the year included *Aëdes* (*Ochlerotatus*) *cantator*, *A. sollicitans*, *A. sylvestris* and *Culex pipiens*.

CARROLL (M.). [**Report on Mosquito Work.**]—*Rept. New Jersey Agric. Expt. Sta., 1917–18, New Brunswick, N.J.*, 1919, pp. 245–276 and 284–291. [Received 6th September 1921.]

Various areas were studied by the author, who has recommended that certain drainage operations should be carried out, and these are here described.

CARROLL (M.) & REILEY (F. A.). **Plans, Specifications and Estimates for Relieving the Ellwood, N.J., Plant of the Atlantic Loading Co., and the May's Landing, N.J., Plant of the Bethlehem Steel Co.**—*Rept. New Jersey Agric. Expt. Sta., 1917–18, New Brunswick, N.J.*, 1919, pp. 277–284, 3 tables. [Received 6th September 1921.]

Of the mosquitos troublesome at the points in question 99 per cent. breed on salt marshes, and fly or are carried by wind to the areas investigated. The salt marsh mosquitos concerned travel on winds of low velocity, 10 miles an hour or less; of high humidity, 70 per cent. or more; and of high temperature, about 80° F. The prevailing winds from May to September, especially July and August, come from the south and south-west, and the marshes in these directions are therefore special sources of infestation.

HEADLEE (T. J.). **Sewage Filter Fly.**—*Rept. Agric. Expt. Sta., 1918–19, New Brunswick, N.J.*, 1920, pp. 444–447. [Received 6th September 1921.]

During the year ending 29th June 1919, the sewage filter fly [*Psychoda alternata*] was successfully controlled by flooding with ordinary sewage.

HEADLEE (T. J.) & CARROLL (M.). **Report of Mosquito Work.**—*Rept. Agric. Expt. Sta., 1918–19, New Brunswick, N.J.*, 1920, pp. 460–464, 474–519, 7 tables. [Received 6th September 1921.]

Much of the information given in this account of measures against mosquitos in New Jersey has already been noticed [*R.A.E.*, B, ix, 26–28, etc.].

BECKWITH (C. S.). **Construction of the Sawmill Creek Sluices and Tide Gates.**—*Rept. Agric. Expt. Sta., 1918–19, New Brunswick, N.J.*, 1920, pp. 465–470. [Received 6th September 1921.]

The construction of automatic sluice gates to improve the sanitary conditions by removing water where mosquitos breed is here described.

CUSHING (G. J. H.). **The Joint Project for Mosquito Control in Camden and Gloucester, undertaken to protect the War Workers at the New York Shipyards, the Pennsylvania and New Jersey Shipyards and Camden Forge.**—*Rept. Agric. Expt. Sta., 1918–19, New Brunswick, N.J.*, 1920, pp. 471–473. [Received 6th September 1921.]

A successful campaign undertaken to protect shipyards and war industries from mosquitos, which are particularly troublesome to workers on night shifts, is described.

HEADLEE (T. J.). **The Mosquitoes of New Jersey and their Control.** —*New Jersey Agric. Expt. Sta., New Brunswick, N.J.*, Bull. 348, 1st January 1921, 229 pp., 129 figs. [Received 6th September 1921.]

This revision of a paper already noticed [*R.A.E.*, B, iii, 212] also describes the present position with regard to mosquito control in New Jersey and discusses the work as carried out up to the end of 1919. [*R.A.E.*, B, ix, 26, 27, etc.]

State Laws concerning Mosquito Control Work in New Jersey.—*New Jersey Agric. Expt. Sta., New Brunswick, N.J.*, Circ. 110, 10th July 1919, 8 pp. [Received 6th September 1921.]

The State laws of New Jersey of 1904, 1906, 1915 and 1912, as amended in 1919, concerning the control of mosquitos are given verbatim.

HEADLEE (T. J.) & CARROLL (M.). **The Mosquito must go.**—*New Jersey Agric. Expt. Sta., New Brunswick, N.J.*, Circ. 111, 17th April 1919, 44 pp., 10 figs. [Received 6th September 1921.]

A popular account is given of the advantages to be gained by suppressing salt marsh mosquitos in New Jersey, and previous work is reviewed. It is proposed that the state of New Jersey shall expend an average of about £45,000 annually to complete the drainage of certain salt marshes in five years.

FRANCIS (E.). **Tularaemia Francis 1921. I. The Occurrence of Tularaemia in Nature as a Disease of Man.**—*Public Health Repts., Washington*, xxxvi, no. 30, 29th July 1921, pp. 1731–1738.

An account is given of seven cases of tularaemia in Utah in 1919 and 1920 [*cf. R.A.E.*, B, vii, 188]. The disease occurs from June to August and originates from the bite of an insect, most probably *Chrysops discalis*. The causal agent is *Bacterium tularense*, and the fly acquires infection by biting jack rabbits suffering from the attack of this organism. Inoculations and cultures prepared from ground squirrels (*Citellus mollis*), also suspected of harbouring the disease, produced lesions in guinea-pigs from which *Bacterium tularense* was isolated.

FRANCIS (E.) & MAYNE (B.). **Tularaemia Francis 1921. II. Experimental Transmission of Tularaemia by Flies of the Species** *Chrysops discalis*.—*Public Health Repts., Washington*, xxxvi, no. 30, 29th July 1921, pp. 1738–1746.

As a result of these experiments, details of which are given, it was found that *Chrysops discalis* is capable of carrying the infection of *Bacterium tularense* in nature from infected jack rabbits to man. Under laboratory conditions the flies were constantly infected up to five days, the longest period being fourteen days. The longer they were kept the less tendency they showed to be infected, which would indicate that *C. discalis* merely acts as a mechanical transmitter of the disease and that the virus does not multiply in the fly.

FRANCIS (E.) & LAKE (G. C.). **Tularaemia Francis 1921. III. Experimental Transmission of Tularaemia in Rabbits by the Rabbit Louse,** *Haemodipsus ventricosus* **(Denny).**—*Public Health Repts., Washington,* xxxvi, no. 30, 29th July 1921, pp. 1747–1753.

The successful transmission of tularaemia from diseased rabbits to healthy ones and to guinea-pigs by means of the rabbit louse, *Haemodipsus ventricosus,* Denny, offers an explanation of the means by which the infection is maintained throughout the year in jack rabbits in Utah.

DUPONT (P. R.). **Entomological and Mycological Notes.**—*Seychelles: Ann. Rept. Agric. & Crown Lands, 1920, Victoria,* 1921, p. 7. [Received 7th September 1921.]

The tick, *Boophilus annulatus australis,* Fuller, is reported as causing severe injury to milch cows in Seychelles. Steps are being taken to use a spray against it, pending the time that compulsory dipping is adopted by the government.

NAGLER (A.). **Bekämpfung der Schafräude durch Begasung.** [The Treatment of Sheep Mange by Fumigation.]—*Berliner Tierärztl. Wochenschr.,* 1920, p. 553. (Abstract in *Deutsche Tierärztl. Wochenschr., Hanover,* xxix, no. 36, 3rd September 1921, p. 458.)

Mange in sheep has been successfully treated by fumigation with SO_2 (sulphurous anhydride) in a wooden disinfection chamber accommodating four animals, and allowing their heads to project through special gas-tight collars. Unshorn animals required 40 minutes at a strength of 6 per cent., increased to 7–8 per cent. if the infestation was severe. Two such applications made within five days kill all mites and eggs. The treatment may be carried out in winter, in any locality, entails no shearing, permits 48 animals to be dealt with in ten hours, and is much cheaper than any other method. After fumigation the animals must be allowed to remain in the open air for a few hours.

CARPENTER (G. H.). **Insect Transformation.**—*London,* Methuen & Co., Ltd., 1921, x + 282 pp., 4 plates, 124 figs. Price 12*s.* 6*d.* net.

In this book the subject of metamorphosis among insects is expounded in a manner that may prove of service to the student and to the general reader. The descriptions of outward and inward growth and change are fully illustrated by selected drawings.

The chapter of the greatest interest from the economic standpoint is that headed "Growing Insects and their Surroundings." This is a study of the relation of environment to insect transformation, and the numerous insects that are selected as illustrations are almost all of economic interest. The artificial control of such insects as mosquitos, house-flies, sheep-maggot flies, ox warble-flies, and in fact, to a greater or less degree, all insects of medical or veterinary importance, largely consists in altering the environment so as to render it unsuitable for them; and the general survey here provided is likely to prove very helpful in this connection.

LAMBORN (W. A.). **A Protozoon Pathogenic to Mosquito Larvae.**—*Parasitology, Cambridge,* xiii, no. 3, August 1921, pp. 213–215.

The discovery of a Protozoon [see next paper], in the gills of the larvae of *Stegomyia albopicta,* Skuse (*scutellaris,* Theo.) is recorded from the Malay States. In most cases the organisms were restricted to the gills, but in some they had pervaded the body cavity, the head and even the interior of the antennae. They escape from the mosquito larva while it is still alive by the rupture or complete separation of the gills. The larvae are apparently not greatly affected by the loss of one gill ; occasionally individuals were found that had lost all four. The larvae all died before pupation. Healthy larvae placed with the infected dead ones sometimes became attacked, but not until three months after the death of the original infected individuals.

KEILIN (D.). **On a New Ciliate:** *Lambornella stegomyiae,* **n.g., n. sp., parasitic in the Body-cavity of the Larvae of** *Stegomyia scutellaris,* **Walker (Diptera, Nematocera, Culicidae).**—*Parasitology, Cambridge,* xiii, no. 3, August 1921, pp. 216–224, 6 figs.

The organism recorded in the preceding paper is described as *Lambornella stegomyiae,* gen. et sp. n. Infection is probably acquired by ingestion. It is likely that parasitic ciliates undergo a process of multiplication within the cyst-wall, and that only those cysts that are filled with young ciliates capable of penetrating the walls of the alimentary canal of the host are infective when ingested by the latter. This would account for the delayed infection obtained.

A list of ciliates parasitic in insects and Arthropods in general is appended.

KEILIN (D.). **On a new Type of Fungus:** *Coelomomyces stegomyiae,* **n.g., n. sp., parasitic in the Body-cavity of the Larva of** *Stegomyia scutellaris,* **Walker (Diptera, Nematocera, Culicidae).**—*Parasitology, Cambridge,* xiii, no. 3, August 1921, pp. 225–234, 7 figs.

During the examination of larvae of *Stegomyia albopicta,* Skuse (*scutellaris,* Theo.) for the presence of *Lambornella stegomyiae* [see preceding paper], several individuals were found to be infected with a fungus here described as *Coelomomyces stegomyiae,* gen. et sp. n. A list of the parasites of mosquitos recorded by various authors is given.

VAN LONKHUIJZEN (J. J.). **Considerations on the Task which the Provincial Council of Cheribon might undertake for improving the Hygienic Conditions in that Province.**—*Meded. Burg. Geneesk. Dienst. Ned.-Indië., Batavia,* x, 1920, pp. 51–75. (Also in Dutch.)

Malaria is said to be one of the most important diseases in the province of Cheribon, which has a coast-line of 104 miles. At the present time the difficulties of antimalaria work in Java are almost insurmountable. There is nothing like a complete knowledge of the species of Anophelines concerned, of the biological conditions on which they depend, or of their flight-radius. The problem requires to be dealt with by the Java Civil Medical Service with the co-operation of the local authorities. Various points requiring the attention of the latter, not only as regards malaria but sanitation in general, are dealt with.

FILIPPINI (A.). **L'Acido cianidrico nella Disinfestazione.** [Hydrocyanic Acid Gas as a Disinfectant.]—*Ann. d'Igiene, Rome,* xxxi, no. 7, July 1921, pp. 419–427.

This is a general review of the properties and use of hydrocyanic acid gas, which is considered a most valuable fumigating agent.

Experiments made by Prof. Alessandrini, using 5 grammes of sodium cyanide per cubic metre of space, show that the following are the number of minutes required to cause death:—Diptera: *Musca domestica, Lucilia* and *Sarcophaga*, 2; *Calliphora* and *Stomoxys*, 2–3; *Culex* and *Anopheles*, 3–4; larvae of *Stomoxys* and *Calliphora* (10 grammes per cu. m.), 60. Lice and other parasites: *Pediculus capitis* and *P. humanus* (*vestimenti*), 4–5; *Phthirus pubis, Cimex* (*Acanthia*) *lectularius*, 5; *Haematopinus suis*, 5–6; *Pulex*, 5–8; and *Tyroglyphus farinae*, 8–10, development of the eggs being unaffected.

SELLA (M.). **Campagna antimalarica nella Spagna.** [Antimalaria Work in Spain.]—*El Sol* [*Madrid*], 25th June 1921, *El Liberal* [*Madrid*], 26th June 1921. (Notice in *Ann. d'Igiene, Rome,* xxxi, no. 7, July 1921, pp. 435–436.)

This is a notice of a lecture on the antimalaria work organised in the Spanish province of Càceres by the League of Red Cross Societies with the co-operation of the Spanish Red Cross.

Malaria causes 11 deaths a year per 100,000 inhabitants in Spain; in some provinces the mortality is as high as 107·1. From 300,000 to 400,000 persons are affected by the disease.

Among the methods that the author proposes to employ are drainage, oiling, screening, quinine prophylaxis, and the use of *Gambusia*. The U.S. Bureau of Fisheries has despatched shipments of this fish to Spain, and its acclimatisation is to be attempted.

The quinine monopoly resulting from the trust of the Java cinchona planters makes quinine very costly, and constitutes a serious obstacle to work against malaria.

MCDUNNOUGH (J.). **A Revision of the Canadian Species of the *affinis* Group of the Genus *Tabanus* (Diptera).**—*Canadian Ent., Guelph,* liii, no. 6, June 1921, pp. 139–144. [Received 20th September 1921.]

The Tabanids dealt with include the new species *Tabanus trepidus, T. nudus, T. rupestris* (from Montana) and *T. atrobasis*.

The author does not accept Hine's treatment of *T. californicus*, Marten, as a synonym of *T. epistates*, O.S., and *T. haemorphorus*, Marten, as a synonym of *T. sonomensis*, O.S. A key is given to the females of the species concerned.

KIEFFER (J. J.). **Chironomides de Philippines et de Formose.**—*Philippine Jl. Sci., Manila,* xviii, no. 5, May 1921, pp. 557–593. [Received 20th September 1921.]

The new Chironomids described include:—*Ceratopogon* (*Prohelea*) *chrysothrix*, from the Philippines and Formosa; *C.* (*P.*) *fuscimanus, Atrichopogon pruinosus, A. haemorrhoidalis, A. insularis* and *A. rufescens* from Formosa; *A. flavidus* and *Culicoides philippinensis* from the Philippines; and *C. alboguttatus* from Formosa. Keys are given to the species of the various genera dealt with.

Yofé (H.). **Proposals for Antimalaria Work in Palestine.**—*Internat. Jl. Public Health, Geneva,* ii, no. 5, September–October 1921, pp. 478–487.

With malaria under control Palestine should become one of the healthiest countries in the world, for it has a mild climate, regular winds and no sudden changes of temperature. The topography of the country is described.

The suggestions here outlined for measures against malaria comprise drainage, intensive treatment of reservoirs of the parasite, quinine prophylaxis, general hygiene, destruction of Anophelines and propaganda. In undertaking extensive schemes agricultural interests as well as the purely sanitary point of view should be considered.

The basis of the necessary work would be simple canalisation with extensive cultivation of the drained territory and the trimming of the bed and banks of the Jordan.

Konsuloff (S.). **Einige Worte über die Mosquito handschuhe.** [Some Remarks on Mosquito Gloves.]—*Arch. Schiffs- u. Trop.-Hyg. Leipsic,* xxv, no. 9, September 1921, pp. 285–287.

On the Macedonian front the author attained success with a combination of the mechanical protection against mosquitos given by a glove with that afforded by an odorous substance used, not as a repellent, but to disguise the smell of the skin. Mosquitos are guided in the dark by this emanation and can bite through gloves unless they are so thick as to be uncomfortable.

Very slightly volatile substances without a strong smell were used. Cambric gloves were lightly impregnated with cresol soap or crude oil, but any substance with the requisite qualities may be used. The gloves, which had an almost imperceptible smell and required treating only once a month, were carried in a small bag. The first tests, made on the banks of Lake Doiran, where *Anopheles maculipennis* abounded, were entirely successful, and further experiences were quite as satisfactory.

Imes (M.) & Schneider (F. L.). **Experimental Treatment of Cattle to prevent Ox Warble Infestation.**—*Jl. Amer. Vet. Med. Assoc., Washington, D.C.,* lix, N.S. x, no. 6, September 1921, pp. 722–727.

Previous experiments in dipping and spraying cattle, with the object of destroying the larvae of *Hypoderma bovis* and *H. lineatum* after they had established themselves in the host, proved unsuccessful. The present ones were undertaken with the object of testing the value of insecticidal treatment in preventing oviposition or the destruction of the larvae before they enter the skin of the host. Very few larvae were found in the winter on cattle that had had their legs protected below the knees and hocks during the preceding fly season. Of the substances tested, a two per cent. solution of coal-tar creosote dip proved the most effective. The results obtained with a wading tank indicate that this method may prove of great practical value, and should further trials confirm its efficacy, it could probably be adapted to meet the requirements in treating range cattle.

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Vogel (R.). **Ueber Vorkommen und Biologie von** *Anopheles* **im Bereich des Etappengebietes der 5. Armee (östliches Frankreich und angrenzendes Belgien).** [The Occurrence and Biology of *Anopheles* in the Region of the German 5th Army (Eastern France and adjoining Belgian Territory. —*Arch. Schiffs- u. Trop-Hyg., Leipsig,* xxv, no. 9, September 1921, pp. 279–284.

These observations were made in the Meuse region between Sedan and Verdun and in the hilly and wooded French and Belgian territory to the east of it. Anophelines occurred wherever suitable conditions, especially stagnant water with green vegetation, were present. The area is densely populated, and there is no lack of food for mosquitos. The latter were very abundant in the low land near the Meuse canal, the numerous marshes and places subject to flooding being most favourable breeding-places, and also on the hills along the Meuse, which are wooded and contain many pools. The Meuse canal itself was free from larvae, at least within a few hundred yards of the locks.

The absence or rare occurrence of Anophelines in the French industrial district of Longwy and Mont St. Martin is due to the enormous development of ironworks which pollute nearly all stagnant waters and prevent breeding.

Sheds for cattle and sheep yielded most mosquitos; pig sheds were not so markedly infested, and stables for horses even less. In the open, Anophelines were seen daily throughout the summer, and were common on walls sheltered from wind and light.

Hibernating individuals were scarce and were represented only by *Anopheles maculipennis*. *A. bifurcatus* appears to hibernate in the larval stage. Cellars, store-rooms and ground-floors were the winter quarters of the few individuals observed. These two species occur together in the Meuse and Crusnes valleys, and probably do so throughout the whole territory.

A. maculipennis attacked chiefly at evening twilight and during the subsequent hours, whereas *A. bifurcatus* did so in the early morning and also in daylight. *A. maculipennis* attacks man in the evening in the open, but the author was only bitten in the absence of domestic animals. Roubaud's observations around Paris [*R.A.E.*, B, viii, 141] seem therefore to hold good for the Meuse region, but the author points out that *A. maculipennis*, both in France and Germany, is widespread, not only as a domestic species but also as an open air one. On the other hand, *A. bifurcatus* cannot be regarded as a purely open air species, for it was taken, full of blood, together with *A. maculipennis* in cattle sheds.

The numerical proportion between *A. maculipennis* and *A. bifurcatus* varies at different times in the same sheds. At Inor the relation was as 9 to 6 in July, but during September *A. bifurcatus* slowly increased, so that on 26th September 21 individuals were taken to 1 of *A. maculipennis*.

There is no certain record of a case of locally acquired malaria infection in the territory dealt with.

Séguy (E.). **Description d'un nouveau Moustique français du Groupe de l'***Aëdes mariae* **et Synopsis des Espèces de ce Groupe.**—*Bull. Soc. Ent. France, Paris,* no. 13, 13th July 1921, pp. 192–195, 1 fig.

Aëdes (*Ochlerotatus*) *berlandi*, sp. n., is described from France, and a key to the species allied to *A. mariae* is given.

AUSTEN (E. E.). **A Contribution to Knowledge of the Blood-sucking Diptera of Palestine, other than Tabanidae.**—*Bull. Ent. Res., London,* xii, pt. 2, September 1921, pp. 107–124, 1 plate, 3 figs.

The species dealt with are: the Chironomids, *Leptoconops kertészi*, Kieff. (the author agreeing with Kieffer in treating *Terscsthes*, Towns., as a synonym of *Leptoconops*, Skuse), *Culicoides vitreipennis*, sp. n., *C. puripennis*, sp. n., *C. tentorius*, sp. n., *C. odiatus*, sp. n., *C. newsteadi*, sp. n., *C. guttularis*, Kieff., *C. odibilis*, sp. n., *C. circumscriptus*, Kieff., and *Forcipomyia* (?) *bipunctata*, L., var.; the Culicids, *Culex tritaeniorhynchus*, Giles, and *C. modestus*, Fic., which are additional to the mosquitos already noticed [*R.A.E.*, B, ix, 98]; the Simuliids, *Simulium flavipes*, sp. n. (attacking horses), and *S. equinum*, L.; the Psychodids, *Phlebotomus papatasii*, Scop., and *P. minutus*, Rond., var. *africanus*, Newst.; the Muscids, *Philaematomyia crassirostris*, Stein, *Stomoxys calcitrans*, L., and *Lyperosia irritans*, L.; and the Hippoboscids, *Hippobosca equina*, L., *H. capensis*, v. Olf., *H. camelina*, Leach, *Lynchia maura*, Big., and *Lipoptena caprina*, sp. n., the last named infesting a goat.

A key to the eight species of *Culicoides* is given.

For bionomic notes on the Anophelines the author refers to his previous paper [*R.A.E.*, B, viii, 51].

BISHOPP (F. C.) & LAAKE (E. W.). **Dispersion of Flies by Flight.**—*Jl. Agric. Res., Washington, D.C.,* xxi, no. 10, 15th August 1921, pp. 729–766, 3 figs, 11 tables.

The following is part of the authors' conclusions to this paper, a summary of which has already been noticed [*R.A.E.*, B, vii, 121].

The experiments carried out show that under rural and urban conditions flies have marked powers of diffusion. The maximum distance of spread from the point of release as recorded in these tests was as follows for the several species: *Musca domestica*, 13·14 miles; *Cochliomyia* (*Chrysomyia*) *macellaria*, 15·1 miles; *Phormia regina*, 10·9 miles; *Lucilia sericata*, 1·2 miles; *L. caesar*, 3·5 miles; *Synthesiomyia brasiliana*, 0·5 miles; *Sarcophaga* spp., 3 miles; *Ophyra leucostoma*, 7 miles; *O. aenescens*, 4·1 miles. The estimated total number of marked flies liberated in all the experiments reported upon was 234,000, but it is considered that too few individuals of species other than *Musca domestica*, *Cochliomyia macellaria*, and *Phormia regina* were liberated to form a reliable guide to their dissemination tendencies.

Marked flies of all species dispersed in all directions from the point of liberation. Among the stimuli inducing dispersion the desire for food and the desire for places for oviposition appear to be among the strongest. The fact that many towns, farmhouses, and other favourable feeding and breeding grounds were passed by the flies shows that *M. domestica*, *C. macellaria* and *P. regina* at least are not satisfied by the mere finding of these places, but have marked migratory habits. *C. macellaria* evinces stronger tendencies toward migration than does *M. domestica*. This tendency in *P. regina* under optimum climatic conditions for the species is probably equal to that in *C. macellaria*. The other species were liberated in numbers too few for conclusions to be drawn, but *Ophyra leucostoma* and *O. aenescens* show marked ability to travel considerable distances.

The exact relation between direction of dispersion and direction of wind could not be determined because of the fluctuating wind conditions experienced. There appears to be a tendency for *M. domestica* and *C. macellaria* mainly to follow the direction of the wind, but they are shown to travel against it and at right angles to it as well. It is concluded that under natural conditions the influence of moderate winds on dissemination is not of great importance.

The evidence gained justifies the conclusion that the passing of vehicles along highways was not a dominating factor in the dispersion of any species of flies in these tests. This does not mean, however, that flies under other conditions may not be widely scattered by artificial means.

These tests show that the house-fly, screw-worm fly, and black blow-fly spread rapidly for many miles. *C. macellaria* was recorded about eight miles from the point of liberation in less than 24 hours, and ten miles in less than 48 hours, after liberation. *P. regina* was recovered about eleven miles away in less than 48 hours after release. *M. domestica* was recovered over six miles from the point of release in less than 24 hours. Males as well as females of the principal species used in these experiments may travel many miles.

The maximum longevity of the marked flies after liberation as shown by the records of capture was: *M. domestica*, 15 days; *C. macellaria*, 17 days; *P. regina*, 10–11 days; *Ophyra aenescens*, 6–8 days; *Sarcophaga* spp., 11–12 days.

While in the fourth experiment no marked flies were captured in the more distant traps (about 17 miles from the point of release), it is the authors' belief that the limits of dispersion were not reached in that test, and that where great numbers of flies are constantly emerging the distance traversed may be much farther than the maximum here determined.

The facility with which flies travel many miles emphasises the importance of the general application of sanitary measures looking toward the suppression of fly breeding.

Davies (L. W.) & Johnson (W. B.). **Notes upon the Occurrence of a Twelve-day Fever of Dengue Group in Nigeria.**—*Jl. Trop. Med. & Hyg., London*, xxiv, no. 14, 15th July 1921, pp. 189–193.

The occurrence is recorded in the Northern Provinces of Nigeria of a fever lasting about 12 days and showing many similarities to dengue fever. The evidence points to the probability of infection by means of a biting insect, and the resemblance to dengue fever would suggest a mosquito. The seasonal occurrence of the disease (July to October) corresponds to the period immediately after the maximum abundance of *Culex* spp. Sand-flies (*Culicoides* sp.) are very troublesome at the same time.

Edwards (F. W.). **Diptera Nematocera from Arran and Loch Etive.**—*Scottish Nat., Edinburgh*, nos. 111–112, 113–114 & 115–116, March–August 1921, pp. 59–61, 89–92 & 121–125, 12 figs.

This list includes the following Chironomids recorded for the first time from Britain: *Forcipomyia canaliculata*, Goet., *Atrichopogon hamiferus*, Goet., *Dasyhelea diplosis*, Kieff., *D. polita*, sp. n., *Culicoides guttularis*, Kieff., *C. heliophilus*, sp. n., *Psilohelea edentata*, sp. n., *P. sociabilis*, Goet., *P. nitidula*, sp. n., *P. perpusilla*, sp. n., *Palpomyia nigripes*, Mg., *Clinohelea subsessilis*, Goet., and *Bezzia tenebricosa*, Goet.

Nicholson (A. J.). **The Development of the Ovary and Ovarian Egg of a Mosquito,** *Anopheles maculipennis,* **Meig.**—*Qtrly. Jl. Micros. Sci., London,* lxv, pt. 3, N.S., no. 259, August 1921, pp. 395–448, 4 plates.

The examination of mosquito ovaries was begun with the object of finding out at what period these organs mature in the hibernating female so that an accurate date for the first oviposition of the season might be determined.

The technique employed and the various stages of development, as well as the anatomy of the structures involved, are fully described. In *Anopheles maculipennis* development generally begins about the middle of March or beginning of April, but this varies according to the season and locality. A meal of blood is essential for the production of eggs. One meal is sufficient, and the eggs are fully developed six days after it.

Hirst (S.). **On some new or little known Acari, mostly Parasitic in Habit.**—*Proc. Zool. Soc., London,* 1921, pt. 2, June 1921, pp 357–378, 15 figs.

The new species described include four species of *Rhinonyssus* from the nasal cavities of sea birds and plovers from the Shetland Islands; *Liponyssus berlesei* parasitic on *Myospalax scansus* in North China; *L. arabicus* taken on a lizard (*Agama adramitana*) in South Arabia; *Listrophorus frontalis* and *L. argentinus* parasitic on rodents in Argentina; *Demodex chiropteralis* on the long-eared bat (*Plecotus auritus*); *D. gliricolens* on water rats (*Arvicola amphibius*); and *D. talpae* from moles (*Talpa europaea*).

A new genus, *Acarapis,* is proposed for *Tarsonemus woodi,* Rennie [*R. A.E.,* A, ix, 275, 338], and the structural differences between it and *Tarsonemus* are described.

Duncan (F. M.). **On the Presence of two Spermathecae in the rare Mole Flea** (*Hystrichopsylla talpae*), **and the Flea as Distributor of a Tyroglyphid.**—*Jl. R. Microscop. Soc., London,* 1921, pt. 3, September 1921, pp. 245–247, 1 plate, 3 figs.

Hystrichopsylla talpae is parasitic on moles and occasionally on field voles. It has also been found in nests of bumble-bees, into which it was probably carried by voles.

Several hypopial nymphs of a Tyroglyphid mite were found clinging to the abdomen of this flea. The species concerned is thought to be related to *Glycyphagus dispar,* and *H. talpae* probably acts as its natural distributor.

Pearce (E. K.). **Typical Flies: A Photographic Atlas. Second Series.**—*Cambridge,* The Univ. Press, 1921, x + 38 pp., 125 figs. Price 15*s.* net.

This volume is supplementary to a previous one with the same title published in 1915, and endeavours to complete the series of typical British Diptera. The preface to the first series, containing instructions for collecting and setting flies, and Brauer's Classification of Diptera are reprinted from the preceding volume. The preface to the present one includes a short list of books that may be of use to the student. Considering the difficulty of the subjects the photographs show an unusual amount of detail, and each is supplemented by useful notes.

del Ponte (E.). **Contribución al Estudio del Gen.** *Triatoma*, **Lap.**—*Rev. Inst. Bact., Buenos Aires*, ii, no. 5, May 1920, pp. 729–744, & iii, no. 1, January 1921, pp. 133-197, 15 plates. [Received 1st October 1921.]

The genus *Triatoma* is abundant in Argentina and neighbouring countries, and is of great importance owing to the fact that it is the transmitting agent of American trypanosomiasis (due to *Trypanosoma cruzi*).

This study includes detailed descriptions of the external and internal anatomy of these Reduviids. An attempt is made to construct a key to most of the known species with the aid of the descriptions of several other authors ; forty-one species are recorded, the majority of which are included in the key.

Kraus (R.). **La Fiebre Petequial en la República Argentina (Prov. de Salta).** [Typhus Fever in the Argentine Republic.]—*Rev. Inst. Bact., Buenos Aires*, iii, no. 1, January 1921, pp. 1–41, 6 maps, 34 figs. [Received 1st October 1921.]

Previous to 1918 typhus was unknown in Argentina as an endemic disease, though there had been two local epidemics in 1894 and 1896 in Entre Rios, introduced probably by Russian immigrants. In 1919, the author wrote an account [*Rev. Inst. Bact.*, ii, no. 1] of the history and epidemiology of the disease in South and Central America. In Mexico, Peru and Chile it has evidently occurred for many years, endemic foci remaining to the present day. In 1920, a delegation was sent to deal with an alarming outbreak in the Provinces of Salta and Jujuy [*R. A.E.*, B, viii, 220]. As a result, many decrees and regulations have been drawn up. Instructions are given for disinfection of houses with carbon bisulphide.

As the greatest obstacle in dealing with the disease is the total lack of hygiene among the population, who are extremely poor and almost entirely uneducated, efforts are being made to educate the public in these matters. To prevent the spread of the disease to the capital of the Province, a sanitary station has been established through which all travellers coming from the infected zone have to pass and where they are thoroughly disinfected and freed from lice. The campaign must be continued for some seasons, but once the system is initiated and well organised, the prevention of infection from neighbouring countries and the extinction of endemic foci should be possible.

Wernicke (R.). **Ensayos con la Cámara desinsectante de Hartmann (Aire caliente circulante).** [Tests with Hartmann's Disinfecting Chambers (hot circulating Air).]—*Rev. Inst. Bact., Buenos Aires*, iii, no. 1, January 1921, pp. 41–48, 7 figs. [Received 1st October 1921.]

The apparatus used in these tests is described and illustrated. The Hartmann chamber differs from that of Vondran in that there is no particular apparatus for causing circulation of the air, beyond that produced by the draught set up by the combustion of naphtha, which also gives rise to a certain amount of moisture in the air. The conclusions drawn from the experiments are that the disinfesting and disinfecting action of dry, warm, still air is in every way equal to the same air in motion. The use of circulating steam, however, is advocated whenever the material can stand it. Vondran's apparatus requires the same time for its action as the still, hot air plant, is very expensive, and serves only for disinfestation and not for disinfection. For disinfestation on a large scale, the same effect is more economically obtained by the use of hot-air chambers provided with ventilators.

CARBONELL (M. V.). **Experiencias de Desinfección por Medio del Aire caliente agitado.** [Experiments in Disinfection by means of circulating hot Air.]—*Rev. Inst. Bact., Buenos Aires*, iii, no. 1, January 1921, pp. 49–54. [Received 1st October 1921.]

The disinfection of clothing, etc., by means of circulating hot air is considered very effective, its killing power being better than that of formol, which only affects the surface and is apt to injure the objects treated.

SMYTH (E. G.). **La Mosca del Ganado.** [The Horn Fly.]—*Porto Rico Ins. Expt. Sta., Rio Piedras*, Circ. 39, February 1921, 17 pp., 4 plates. [Received 1st October 1921.]

This is a revision of an earlier paper on *Lyperosia irritans* [*R. A. E.*, B, viii, 201]. It is still hoped that further efforts will be made to introduce insect enemies, though attempts in this direction have hitherto failed.

Departmental Activities: Entomology.—*Jl. Dept. Agric. Union S. Africa, Pretoria*, iii, no. 3, September 1921, pp. 208–210.

A theory is propounded by Mr. R. H. Harris, who is engaged on tsetse-fly investigations in Zululand, in explanation of the extension of infested areas. The fly [*Glossina pallidipes*] only persists where shade is present, and it is suggested that areas that were once open country are gradually becoming covered with *Acacia*, and consequently favourable to the fly, through irregularity of burning off the grass. The germination of the seeds of this thorn is greatly accelerated by heat, and after a bush fire young trees soon appear. If, however, the ground were burnt regularly every year, the chance of survival of the seedlings would be remote, but each year that they escape a fire they become more resistant to it. Neglect of burning for a few years therefore causes a gradual transformation from open grass to thorn scrub; this change takes place almost imperceptibly, but its resulting influence on the numbers of tsetse-fly is very marked.

BATES (L. B.), DUNN (L. H.) & ST. JOHN (J. H.). **Relapsing Fever in Panama. The Human Tick, *Ornithodoros talaje*, demonstrated to be the transmitting Agent of Relapsing Fever in Panama by Human Experimentation.**—*Amer. Jl. Trop. Med., Baltimore*, i, no. 4, July 1921, pp. 183–210, 4 charts. [Received 3rd October 1921.]

Several cases of relapsing fever are recorded from a village outside the Panama Canal Zone and about eight miles from Balboa. The tick, *Ornithodorus talaje*, Guér., was thought to be the transmitting agent, and this was confirmed by experiments on various animals, including monkeys (*Macacus rhesus*) and man.

The authors have not been able to trace any previous record of relapsing fever being definitely transmitted by *O. talaje*.

Grassi (B.). **Osservazioni sulla Vita degli Anofeli.** [Observations on the Life of Anophelines.]—*Rend. R. Accad. Naz. Lincei, Rome,* Classe Sci. fisiche, matemat. e naturali, xxix, nos. 10–11, 21st November–5th December 1920, pp. 307–313, 339–344.

During the summer of 1920 fourteen batches of about 10,000 marked Anophelines were released in a locality where mosquitos find little shelter, so that the conditions for recapture were most favourable. In spite of diligent efforts, only 1·8 per cent. were retaken, and hardly any after 12–14 days. The author concludes that in the warm season the life of Anophelines is very brief. This is supported by the observation that most infected Anophelines harbour zygotes in early stages of development, and as a rule the Anopheline host perishes before the zygote matures. Sella has observed that in warm weather the development of each batch of eggs only requires 2–4 days, so that the mosquitos would increase enormously were it not for the high mortality. Roubaud and Griffith ascribed the disappearance of marked specimens to migration, but the conditions attending the author's experiments point to a high death-rate being the probable explanation.

This mortality of Anophelines may help to explain their presence in the absence of malaria, for of a hundred specimens that have fed perhaps only one lives for the period of 13–15 days necessary for the sporozoits to reach the salivary glands and to transmit infection. This also explains why the return of malaria-infected troops only causes a temporary increase of malaria in places that are not decidedly mosquito-infested.

Anophelines, while they frequently go away from the locality where they have fed, tend to return there. This tendency to return is limited, but suggests measures against the adults in dwellings—particularly where cases of malaria exist—rather than in pigsties, etc.

Grassi (B.). **L'Anofele può propagare la Malaria direttamente?** [Can *Anopheles* also transmit Malaria directly?]—*Rend. R. Accad. Naz. Lincei, Rome,* Classe Sci. fisiche, matemat. e naturali, xxx, no. 11, 3rd June 1921, pp. 336–337.

Experiments are described which appear to prove that the author's hypothesis that malaria may be directly transmitted [*R. A.E.*, B, ix, 142] has no foundation.

Grassi (B.). **L'Anofele puó propagare la Malaria direttamente?** [Can *Anopheles* also transmit Malaria directly?]—*Atti R. Accad. Naz. dei Lincei, Rome,* xxx, August 1921. (Abstract in *Ann. d'Igiene, Rome,* xxxi, no. 9, September 1921, pp. 582–583.)

Continuing the experiments referred to in the preceding paper, further work has been carried out with the same negative result.

The saliva of *Culex* kills the human malarial parasite, while that of *Anopheles* does not do so. Furthermore it is known that an Anopheline driven away before it is satisfied may immediately bite anew, and there might be a possibility of the new host being infested by a regurgitation of infected blood previously obtained. Hence the need for these experiments.

GRASSI (B.). **Osservazioni sulla Biologia degli Anofeli. Gli Amori degli Anofeli.** [Observations on the Biology of Anophelines. The Mating of Anophelines.]—*Ann. d'Igiene, Rome,* xxxi, no. 8, August 1921, pp. 453–456.

In 1921 the author was able to test his theory that Anophelines mate in the open air. The observations were made in a locality on the Bay of Naples where malaria does not occur. Wesenberg-Lund in his work on Danish Culicids [*R. A.E.*, B, ix, 82] recorded the males of *A. maculipennis* (*claviger*) in small swarms in June at sunset, approximately 50 yards from a stable where about one hundred gorged females were present ; a few females that did not come from the stable and had apparently not had a feed of blood were seen entering the swarms.

The author and other observers noticed on 11th July that the swarms of males, which usually occur near pigsties, began to form at 6.50 p.m., the sky being overcast, the temperature relatively low, with no perceptible wind and with intermittent rain. On 12th July the swarms formed at 7.5 p.m., the weather being fine with a moderate wind. The swarms occurred over reed-thatched pigsties, manure heaps and straw heaps, at heights varying from about 20 inches to 6½ feet. They gradually increased in size.

Females, presumably coming from the pigsties or from adjacent houses, separately approached the swarms, and though the exact point where mating began was not noticed, pairs were seen either close to the swarms or in them. Immediately after uniting the pairs fly away, usually with the wind. Of three captured pairs one of the females contained blood, apparently ingested some hours before. Relatively few mating individuals were, however, seen during the 50–70 minute period of swarming. With the advance of darkness the swarms decrease. On 11th July they disappeared under heavy rain at 7.30 p.m., and on the 12th July at 8.5 p.m., the weather being fine. During these observations, the only mosquitos that attempted to bite the observers were species of *Culex*. There is no explanation of the fact that so few Anophelines mated. In one instance a swarm captured *en masse* yielded several hundred males and only two females, while on other occasions no females were taken. The females were never seen to swarm.

There is little doubt that swarming aims at attracting the females, but it is remarkable that so many males return unmated to their shelters. That some, at least, do return has been proved by tests with marked individuals. It is probable that the most important time of pairing has not been discovered ; possibly it occurs at night. On 20th July a very small swarm was observed at daybreak. This agrees with a previous observation that a few Anophelines come into the open before daybreak [*R. A.E.*, B, ix, 168].

It is not possible to say how often mating takes place. In one experiment five mature females died without ovipositing, while twenty-five deposited eggs, three dying immediately after doing so. Of the remainder, twenty-one had been fertilised and one had not been. Of the twenty-five batches of eggs two did not develop. In any case it is clear that one mating suffices for more than one oviposition.

As a measure against malaria it is not certain whether the capture of swarms is useful. On the one hand it would check the increase of Anophelines, but on the other it would increase the number of females that suck blood without having been fertilised, and it is probable that the consequent prolongation of their life would favour the completion of the sexual cycle of the malarial parasites and the probability of their transmission to man.

Klein (W.). **Wirkung der schwefligen Säure auf den Organismus mit besonderer Berücksichtigung der perkutanen Säurevergiftung.** [The Action of Sulphurous Acid on the Animal Organism with special Regard to Acid Poisoning through the Skin.]—*Berliner Tierärztl. Wochenschr.*, 1921, p. 49. (Abstract in *Deutsche Tierärztl. Wochenschr., Hanover*, xxix, no. 40, 1st October 1921, p. 513.)

Of some thousands of horses fumigated with sulphurous acid (SO_2) against mange, 7 per cent. showed symptoms of slight poisoning, while 1 per cent. were severely affected. The latter, however, regained consciousness about 10 minutes after their removal from the disinfection chamber, and their recovery was complete in a short time. Fumigation has a beneficial effect on wounds that are slow to heal and on cancer of the hoof.

Schein (H.). **Les Piroplasmoses en Indochine.**—*Bull. Agric. Inst. Sci., Saigon*, iii, no. 9, September 1921, pp. 269–283, 1 plate.

Present knowledge concerning the various forms of piroplasmosis occurring in domestic animals in Indo-China is reviewed, with notes on their aetiology, though much remains to be learnt in this respect. The importance of tick destruction is emphasised, and it is suggested that various methods, such as rotation of pastures, dipping, burning and closing the pastures until all ticks die out, should be combined, as is done in the United States. If the cattle-breeding industry in Indo-China increases in importance, it will be necessary to maintain a campaign against ticks.

Carter (H. F.), Ingram (A.) & Macfie (J. W. S.). **Observations on the Ceratopogonine Midges of the Gold Coast with Descriptions of New Species. Part IV.**—*Ann. Trop. Med. & Parasit., Liverpool*, xv, no. 3, 30th September 1921, pp. 177–212, 13 figs.

The history of the erection of genus *Dasyhelea* and its subgenera is given, and the points of difference between the anatomy of *Dasyhelea* and *Culicoides* in all stages are detailed.

The following new species are described: *D. pallidihalter*, *D. fusciscutellata*, *D. similis*, *D. luteoscutellata*, and *D. flava*, bred from material collected at the base of banana plants; *D. inconspicuosa*, *D. flaviformis*, and *D. fusca*, bred from water and rotten wood in canoes; *D. nigrofusca*, bred from materials collected in rot-holes in a mango tree; *D. fusciformis*, reared from material collected in rot-holes in a tree (*Cynometra* sp.); *D. nigricans*; and *D. fuscipleuris*. A key to both sexes of these new species is given.

Gordon (R. M.) & Young (C. J.). **The Feeding Habits of *Stegomyia calopus*, Meigen.**—*Ann. Trop. Med. & Parasit., Liverpool*, xv, no. 3, 30th September 1921, pp. 265–268.

In 1906 Marchoux and Simond stated that *Stegomyia fasciata* (*calopus*) under normal conditions does not bite man during the day after the first five or six days of its adult life, and that yellow fever is not transmitted between 7 a.m. and 5.30 p.m.; but Seidelin and Connal in 1914, and Macfie in 1915, showed that *S. fasciata*, when in captivity, bites at any hour irrespective of age.

In the experiments here described, the conclusions reached were that, under natural conditions, *S. fasciata* will bite either by day or night, for 14 days after the first blood meal.

NEWSTEAD (R.) & EVANS (A. M.). **Report on Rat-flea Investigation.**—*Ann. Trop. Med. & Parasit., Liverpool*, xv, no. 3, 30th September 1921, pp. 287–300, 7 tables, 4 charts.

The investigations here described were undertaken to determine the distribution of fleas occurring on rats in the Port and City of Liverpool, with special reference to those species responsible for transmitting plague. Tables show the number of rats taken on ships and the ports they came from, the distribution of the rats, *Mus rattus* and *M. norvegicus*, and of the fleas, of which five species occurred, namely: *Xenopsylla cheopis*, Rothsch., *Leptopsylla musculi*, Dugès, *Ceratophyllus fasciatus*, Bosc., *C. londoniensis*, Rothsch., and *Ctenocephalus canis*, Curtis. The first named occurred freely on rats in ships, and was found on rats from dock sheds; isolated specimens were also taken from warehouses and in the city. A permanent breeding place was discovered in certain premises in the warehouse zone. *Ceratophyllus fasciatus* was universally prevalent. The number of fleas per rat was greatest during the summer months, but the curve of frequency could not be correlated in detail with that of the average temperature. *Ceratophyllus londoniensis* was found rarely in the city and docks. *L. musculi* seldom occurred on ship rats and was most prevalent on rats from the docks. One individual of *Ctenocephalus canis* was taken in the city. *Ctenophthalmus agyrtes*, Heller, was not found.

YOUNG (C. J.). **Natural Enemies of** *Stegomyia calopus*, **Meigen.**—*Ann. Trop. Med. & Parasit., Liverpool*, xv, no. 3, 30th September 1921, pp. 301–313, 2 figs., 2 plates.

The absence of larvae of *Stegomyia fasciata* (*calopus*) from many suitable breeding places in Brazil, attracted attention during their collection in Manáos. They proved capable of developing in such places except where aquatic insects were present, and experiments proved that the larvae are destroyed in varying degrees by the larvae of dragonflies, water beetles and various Rhynchota. The mosquito larvae most commonly found were those of *S. fasciata* and *Culex fatigans*. The latter are less liable to attack by predaceous enemies, as they are more active and can remain stationary at the surface for long periods.

Experiments were carried out with the larvae of dragonflies (AESCHNIDAE and LIBELLULIDAE) and water bugs (*Zaitha* spp.). The former larvae were found all the year and can live in comparatively foul water. One species used experimentally, *Pantala flavescens*, destroys larvae and pupae of *S. fasciata* of all sizes. The water bugs were less common. They feed on aquatic insects and others, such as grasshoppers, that fall into the water. The results show that dragonfly larvae alone are most effective against *S. fasciata*, and a combination of water bugs and dragonfly larvae against *C. fatigans*. In experiments under natural conditions, two barrels containing larvae of

Stegomyia were cleared in 24 and 48 hours after the introduction of five dragonfly larvae. Individuals of both dragonfly and water bug larvae at times destroyed over a hundred mosquito larvae in 24 hours.

It was also proved that dragonfly adults pursue and destroy *S. fasciata*.

BISHOPP (F. C.). *Solenopotes capillatus*, **a sucking Louse of Cattle not heretofore known in the United States.**—*Jl. Agric. Res., Washington, D.C.*, xxi, no. 11, 1st September 1921, pp. 797–801, 6 figs.

A full description is given of all stages of both sexes of *Solenopotes capillatus*. Enderlein described this louse on cattle in Germany, in 1904, but in 1916 Ferris considered it to be synonymous with *Linognathus vituli*, L. Further material collected on cattle, which was neither *L. vituli* nor *Haematopinus eurysternus*, Nitzsch, has proved to be *S. capillatus*, as described by Enderlein.

COOLEY (R. A.). **18th Annual Report of the State Entomologist of Montana.**—*Montana Agric. Expt. Sta., Bozeman*, Bull. 139, January 1921. p. 15. [Received 10th October 1921.]

The most troublesome parasite of domestic animals in Montana is *Gastrophilus haemorrhoidalis*, L. (nose-fly). This fly, though formerly occurring in the eastern countries only, has spread during the last few years over the entire State. *Hypoderma lineatum*, Villers (ox-warble fly) has been reported as attacking horses. *Sarcophaga kellyi*, Ald., is chiefly important as being destructive to grasshoppers.

Fighting Mosquitoes with Fish.—*7th Ann. Rept. Internat. Health Bd., Rockefeller Foundation, 1920, New York*, January 1921, pp. 20–23, 4 figs. [Received 14th October 1921.]

The efficacy of top minnows (*Gambusia affinis*) as destroyers of *Anopheles* larvae is emphasised. In 89 per cent. of the waters in Hinds county, Mississippi, in 1919, and in 85 per cent in 1920, mosquito breeding was completely controlled by this fish. This method is now being adopted in Mexico, Central America and Peru throughout the region where yellow fever occurs.

Operations against Yellow Fever.—*7th Ann. Rept. Internat. Health Bd., Rockefeller Foundation, 1920, New York*, January 1921, pp. 102–109, 4 figs. [Received 14th October 1921.]

During 1920 co-operative work against yellow fever was undertaken in every region in which it is known to exist, and steady headway is being made towards its control. In Mexico and Central America the inauguration of control measures throughout the infected districts has been authorised, provision has been made for the creation of a special yellow fever commission, and about £5,000 at par have been set aside for carrying out the work. Under the direction of the Board of Health the epidemic in Mexico during the last six months of 1920 was checked.

In July 1920 the entire eradication of yellow fever from Ecuador was officially announced. The infection present in Guayaquil since 1842 has been completely controlled, and there is every reason to believe that it has been entirely suppressed. A modern water supply is being installed in the city, but until it is in operation strict supervision of all water containers will be maintained so as to prevent the breeding of *Stegomyia*. The responsibility for the continued maintenance of the work was taken over by the Government on 29th November 1920.

During 1920, yellow fever occurred in Salvador and Guatemala, and a few cases were reported from Nicaragua. As a result of prompt action in the former States, the disease had almost entirely disappeared by the end of the year. Anti-mosquito measures, including control by means of fish, are to be continued for at least a year after the disappearance of the last case of the disease. In Nicaragua and Honduras anti-mosquito work was carried on throughout 1920. Protective measures were also successfully employed in Peru and Brazil, but in Peru the disease reappeared in February 1921 at a point south of the region previously infected.

In July 1920 a special commission began investigations in Nigeria, Dahomey, the Gold Coast, Senegal, and the Belgian Congo, but no authentic cases of yellow fever were observed, although statistics indicate that yellow fever, or an infection closely allied to it, had existed endemically and epidemically for many years. The study of yellow fever in this area is likely to prove a most arduous task and will require prolonged local residence; the commission only remained fifteen weeks on the West Coast of Africa. It is suggested that another body of investigators be sent to undertake the work and to suggest definite measures for the suppression of the disease should it be found.

LAVIER (G.). **Les Parasites des Invertébrés Hématophages.**—*Lab. Paras. Fac. Med., Paris,* 1921, 218 pp.

The parasites of blood-sucking invertebrates can be divided into two categories. The first includes those that are common to both vertebrates and invertebrates, that is, those that the invertebrate is capable of transmitting. These parasites can again be divided into two classes according to their behaviour in the invertebrate host; that is, those that undergo no development in the invertebrate but are mechanically transmitted to a vertebrate, and those that develop in the invertebrate from harmless to dangerous forms capable of producing disease in a vertebrate. In some cases the intermediate host is exclusive, as in the case of the parasites of human malaria, which develop always in *Anopheles*, and of certain trypanosomes which can develop only in *Glossina*; others have a wider choice of hosts, such as *Trypanosoma cruzi*, which can develop in many species of Reduviids, some species of *Cimex* and certain Acarids.

The parasite can be transmitted from invertebrate to vertebrate by a simple puncture, when it is injected with the saliva or by regurgitation of the stomach contents; or by a similar biological process producing a similar result, such as the piercing of the Dutton membrane in the proboscis of the mosquito by the escaping *Filaria*, or the passage of spirochaetes in the coxal fluid secreted by *Ornithodorus* when engorging. It may also be transmitted by crushing the invertebrate host, such as the louse, which may then contaminate the skin with liquid harbouring *Treponema recurrentis*; or by ingestion of the invertebrate, in such cases as the dog swallowing fleas and becoming infected with *Dipylidium caninum* or the rat with *Trypanosoma lewisi*.

The second category comprises parasites that are apparently peculiar to invertebrates, but these also would appear to be pathogenic to vertebrates in certain circumstances; in this respect the intestinal flagellates of insects should especially be studied. Investigations do not at present admit of definite conclusions, but it may be that the trypanosomes in the blood of vertebrates will be traced to this origin. Among the parasites exclusive to invertebrates are certain forms (fungi, microsporidia and Hymenoptera) that are definitely harmful to them; by elucidating their biology it will be possible to use them as valuable auxiliaries in the campaign against such dangerous insects as *Glossina*.

The author has collected information from all available sources on the subject of the parasites of blood-sucking organisms. Each of the latter is dealt with under the group to which it belongs. Indices are appended of the invertebrate hosts and of the parasites, and a complete bibliography is also given.

CHANAL (L.). **Rôle pathogène des Moustiques en Pathologie humaine et comparée.**—*Lab. Paras. Fac. Med., Paris,* 1921, 91 pp.

This is a useful compilation of the published data regarding the species of mosquitos that are suspected of being pathogenic, and their relation to disease, particularly to malaria. The synonymy of each species is recorded, though the author does not claim that it is complete. The disease or diseases transmitted by each species are discussed.

With regard to malaria, it is recorded whether the species in question has been found naturally infected,and in what proportion, and, wherever possible, any experiments regarding the development of the malarial parasite in it are described. A list of mosquito-borne diseases is given, with the species responsible for their transmission. A useful index is appended, distinguishing the valid species from the synonyms.

Of 46 species of *Anopheles* that have been studied for the development of malarial parasites, complete development of at least one species of human *Plasmodium* has been shown to be possible in 41; in the remainder it did not occur. The degree of receptivity varies with the species; for example, in the case of *P. praecox* (*falciparum*), 100 per cent. of *A. ludlowi* proved infective, and only 1·5 per cent. of *A. indefinitus*. It also varies for the same species of *Anopheles* according to the species of *Plasmodium* used; thus, *A. ludlowi* became infected with *P. praecox* 37 times in as many tests; with *P. vivax*, 38 times out of 47, and with *P. malariae*, 5 times only out of 107. Recent experiments with large numbers of mosquitos have shown the possibility of infection in some species hitherto not recognised as carriers; it seems, in fact, as though no species of Anopheline is absolutely resistant to development of the malarial parasite, but that in certain species the receptivity is so slight that it is only discoverable after a long series of tests.

It is pointed out that the facility with which the *Plasmodium* develops in an Anopheline is not the only factor in the epidemiology of malaria; other points to be considered are the abundance of the mosquito concerned and its biology. The fact that a domestic species that is not easily infected is infinitely more dangerous than a highly susceptible forest species has been largely overlooked, but is of the greatest importance both as elucidating the epidemiology of malaria and also as indicating lines of prophylaxis.

Of eighteen species of Culicines tested, none showed a trace of development of any human *Plasmodium.* On the other hand, seven transmit *P. danilewskyi* to birds ; ten have been found to transmit *Filaria bancrofti*, though neither *Acanthocheilonema* (*F.*) *perstans* nor *F. juncea* show any development in mosquitos. *Dirofilaria immitis* of the dog can complete development in two species of mosquitos. *Stegomyia fasciata* is the only mosquito known to transmit yellow fever. Dengue fever is transmitted by four species of Culicines. Two Culicines of the genus *Janthinosoma* carry the eggs of *Dermatobia hominis* (*cyaniventris*) and thus disseminate human and animal myiasis. The mechanical transmission of human and animal trypanosomes has also been obtained in the case of two species of mosquitos. Further research will undoubtedly reveal an even greater scope of pathogenicity of mosquitos both in animal and human diseases.

Pillers (A. W. N.). **Scaly Leg in Fowls.**—*Vet. Record, London,* N.S., no. 42, 15th October 1921, pp. 827–829, 4 figs.

Scaly leg in fowls due to the Sarcoptid mite, *Cnemidocoptes mutans,* is described and illustrated, and the usual remedial measures are advocated [*R. A. E.*, B, ii, 44].

Prompt Mosquito Control by use of the Top Minnow, *Gambusia.*—*Public Health Repts., Washington, D.C.,* xxxvi, no. 36, 9th September 1921, pp. 2220–2221.

A case is recorded in which the numbers of Anopheline larvae were greatly checked by the introduction of top minnows (*Gambusia* sp.) into a pond.

Dyar (H. G.). **The Genus** *Haemagogus,* **Williston. (Diptera, Culicidae.)**—*Insecutor Inscitiae Menstruus, Washington, D.C.*, ix, no. 7–9, July–September 1921, pp. 101–114.

In the genus *Haemagogus* the females of many species are practically indistinguishable, whereas the male genitalia show marked characters. Some of the older species cannot be recognised at present as they are described from females, and no males are available from type localities.

A key to the species, based on the male genitalia, is given, those dealt with including *Haemagogus* (*Stegoconops*) *panarchys*, sp. n., from Ecuador ; *H.* (*Haemagogus*) *iridicolor,* sp. n., from Costa Rica ; *H. gladiator,* sp. n., from Panama, in tree-holes ; *H. chalcospilans,* sp. n., bred from larvae occurring in salt pools in Panama ; and *H. janthinomys*, sp. n., bred from larvae in tree-holes in Trinidad.

Dyar (H. G.). **Illustrations of certain Mosquitoes.**—*Insecutor Inscitiae Menstruus, Washington, D.C.*, ix, no. 7–9, July–September 1921, 114–118, 1 plate.

The species dealt with include : *Culex* (*Helcoporpa*) *trifidus,* sp. n., from Costa Rica ; *C.* (*Culex*) *chidesteri,* sp. n., from Panama ; and *Uranotaenia orthodoxa,* sp. n., from Costa Rica.

Townsend (C. H. T.). **Some new Muscoid Genera, ancient and recent.**—*Insecutor Inscitiae Menstruus, Washington, D.C.*, ix, no. 7–9, July–September 1921, pp. 132–134.

The new genera proposed include *Austenina* for *Glossina brevipalpis*, Newst.; *Awatia* for *Musca indica*, Awati; and *Newsteadina* for *Stomoxys fuscus*, Wlk.

Dyar (H. G.). **Two new Mosquitoes from China (Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus, Washington, D.C.*, ix, no. 7–9, July–September 1921, pp. 147–148.

Aëdes (*Finlaya*) *eucleptes*, sp. n., and *A.* (*Stegomyia*) *christianus*, sp. n., are described from China.

Dyar (H. G.). **The Mosquitoes of Argentina.**—*Insecutor Inscitiae Menstruus, Washington. D.C.*, ix, no. 7–9, July–September 1921, pp. 148–150.

Since the publication of the author's previous paper [*R.A.E.*, B, vii, 107] further material from Argentina has been examined and the mosquitos dealt with include: *Sabethes cyaneus*, F., *Limatus leontiniae*, Brèthes, *Aëdes scapularis*, Rond., and *Uranotaenia pulcherrima*, Lynch.

Culex dolosa of Lynch [*loc. cit.*] must be restricted to his male (= *bonariensis*, Brèthes), while his female becomes *Aëdes lynchii*, Brèthes. *Psorophora apicalis*, Theo., and *P. neoapicalis*, Theo., are synonyms of *P. confinnis*, Lynch. *Haemagogus spegazzinii*, Brèthes, is the same as *H. capricornii*, Lutz, from Brazil, but the exact status of the latter species must await the discovery of the male. It may be synonymous with *H. equinus*, Theo.

Hornby (H. E.). **Trypanosomes and Trypanosomiases of Cattle.**—*Jl. Comp. Path. & Therap., Edinburgh*, xxxiv, pt. 3, September 1921, pp. 211–240, 1 fig.

A summary is given of the African trypanosomes of cattle. They are: *Trypanosoma congolense*, very pathogenic, transmitted by *Glossina* spp.; *T. vivax*, pathogenic, transmitted by *Glossina* spp.; *T. uniforme*, possibly identical with *T. vivax*, pathogenic and transmitted by *G. palpalis*; *T. evansi*, slightly pathogenic and also occurring in South Asia, the Philippines and Mauritius, transmitted mechanically by Tabanids and other biting flies; *T. brucei*, slightly pathogenic, transmitted by *Glossina* spp.; *T. gambiense*, slightly pathogenic, transmitted by *G. palpalis*; *T. theileri*, non-pathogenic, occurring in every part of the world, transmitted by *Hippobosca*, and probably by *Tabanus glaucopis* in Germany; and *T. ingens*, non-pathogenic.

Patton (W. S.). **Studies on the Flagellates of the Genera *Herpetomonas*, *Crithidia* and *Rhynchoidomonas*. No. 7. Some miscellaneous Notes on Insect Flagellates.**—*Ind. Jl. Med. Res., Calcutta*, ix, no. 2, October 1921, pp. 230–239, 3 plates.

Herpetomonas craggi, sp. n., is parasitic in the alimentary tract of adults of *Musca bezzii*, where it evidently completes its life-cycle, as it has not been found in either mature or immature larvae. Although over 30 per cent. of the females of *M. bezzii* are also infected with a yeast and about 5 per cent. with a species of *Habronema* that destroys the ovaries, the species is abundant wherever it occurs. This fly has a habit of worrying a blood-sucking fly, such as *Stomoxys calcitrans*, on cattle till the latter withdraws its proboscis; *M. bezzii* then feeds on any blood that exudes [*R.A.E.*, B, i, 209]. It also feeds on dried spots of blood.

Herpetomonas mirabilis, Roub., has been recorded from the alimentary tract of *Chrysomyia albiceps* (*putoria*) from West Africa and from *C. megacephala* and *Lucilia craggi* in India. It also develops in the alimentary tract of the larva of *L. argyricephala*, the infection being carried over to the adult stage through the pupa. This flagellate cannot be transmitted to *Musca nebulo*, and the author has only found it in the CALLIPHORINAE in India.

H. muscae-domesticae, Burnett, is parasitic in *Musca nebulo*, *M. humilis*, *Fannia canicularis*, *Borborus* sp., *Drosophila* sp., *Lucilia argyricephala*, *L. craggi* and several other CALLIPHORINAE. It is ingested by the adults when feeding on infected excreta, and it can also live and multiply in the alimentary tract of the larvae of some of its hosts. The larvae of *M. nebulo* are commonly infected with this flagellate, the infection persisting to the adult stage. The larvae also acquire the parasite by ingestion. This *Herpetomonas*, like all others, cannot live in the NNN medium with bacteria, as they soon overgrow it and kill it, but in the alimentary tract of the host it may be present with faecal bacteria as long as the latter do not gain the ascendency.

H. sarcophagae, Prowazek, is common in many species of *Sarcophaga* and is generally found in the hindgut in the round post-flagellate stage. Attempts to infect *Musca nebulo* with this species failed. A *Crithidia* showing some peculiarities common to certain trypanosomes was found in two species of Sepsids. The flagellate in question could under no circumstances have been acquired from the blood of a vertebrate, as it was found in a purely dung-feeding fly. A species of *Herpetomonas* was also present in one of these flies.

It is suggested that the study of the life-histories of these insect flagellates would be of great value as an aid to the understanding of the related forms likely to become pathogenic to man and animals. White mice were not found suitable for experiment with Herpetomonads.

PATTON (W. S.), LAFRENAIS (H. M.) & SUNDARA RAO (—). **Studies on the Flagellates of the Genera** *Herpetomonas, Crithidia* **and** *Rhynchoidomonas*. **No. 8. Note on the Behaviour of** *Herpetomonas tropica*, **Wright, the Parasite of Cutaneous Herpetomonas (Oriental Sore) in the Bed Bug,** *Cimex hemiptera*, **Fabr.**—*Ind. Jl. Med. Res., Calcutta*, ix, no. 2, October 1921, pp. 240–251, 2 plates, 1 fig.

Previous experiments carried out by the senior author show that *Musca nebulo* and body and head lice [*Pediculus humanus* and *P. capitis*] play no part in the transmission of the parasite of Oriental sore from man to man, and there is no evidence to incriminate *Pulex irritans* or *Ctenocephalus canis*. *Cimex hemiptera* appeared to be the only possible insect carrier, though the parasite is not transmitted by the bug in the act of sucking blood. In Mesopotamia the organism causing Oriental sore is *Herpetomonas phlebotomi*, which produces the sore by multiplying in the skin.

This paper records observations on the behaviour of *Herpetomonas tropica* in the alimentary tract of *Cimex hemiptera* and also reviews some points in the etiology of the disease. The technique employed is described in detail.

Living *Herpetomonas tropica* may be found in the rectum of an adult bug 24 hours after feeding them on cultures of the parasite. In microscopic preparations the organisms may be found in the alimentary tract as late as the 19th day after the feed. From microscopic examinations it would seem that the parasite disappears from the midgut if the bugs are not fed again after the original feed on the culture. If re-fed on clean human blood, a number of round, growing flagellates appear in the midgut which multiply and produce an intense infection.

It was found that *H. tropica* can live for 23 days in the alimentary tract of starved bugs; 34 days in the stomach of adults re-fed on clean blood; 44 in the hind intestine and 34 in the rectum; 33 in the midgut of a nymph re-fed on clean blood; 36 in the hind intestine and rectum, and at least 9 in the midgut of a fed larva.

Future observations may show that the organism can live for several months. It is considered that the above observations support the hypothesis that *Cimex hemiptera* is the true invertebrate host of *H. tropica* in India. It was also found that *H. tropica* has an intracellular stage in the cells of the midgut of *Cimex hemiptera* similar to that of *H. donovani*. The discovery of this stage in the life-history of the parasite is considered to prove conclusively that *C. hemiptera* is the true invertebrate host.

PATTON (W. S.), LAFRENAIS (H. M.) & SUNDARA RAO (—). **Studies on the Flagellates of the Genera** *Herpetomonas, Crithidia* **and** *Rhynchoidomonas*. **No. 9. Note on the Behaviour of** *Herpetomonas donovani*, **Laveran and Mesnil, in the Bed Bug,** *Cimex hemiptera*, **Fabricius.**—*Ind. Jl. Med. Res., Calcutta,* ix, no. 2, October 1921, pp. 252–254.

Herpetomonas donovani, the organism causing kala-azar, can live as long as 41 days, probably longer, in the midgut of *Cimex hemiptera* even when the latter is fed six times on clean human blood after the one infected meal.

ADIE (H. A.). **Preliminary Note on the Development of the Leishman-Donovan Parasite in Spleen Juice and in the Alimentary Tract of** *Cimex lectularius* **(Lin.).**—*Ind. Jl. Med. Res., Calcutta,* ix, no. 2, October 1921, pp. 255–260, 4 plates.

The experiments described were carried out with *Cimex hemiptera* (*rotundatus*) and *C. lectularius*, L., fed on spleen-juice mixed with patients blood.

It appears that the vegetative intracellular and propagative phases of Leishman-Donovan parasites react to stimuli and environment. This is perhaps the reason why kala-azar flourishes in Assam, Madras and the Mediterranean, and other regions where the optimum temperature is not exceeded for prolonged periods. The development of the parasite in the human spleen and the stomach of *Cimex lectularius* is described The first part of the intracellular stage in the bed-bug is exactly similar to that of *Trypanosoma lewisi* in the rat-flea. The final stages of the extra-corporeal cycle in the bug may also prove similar to the above. A complete report of these observations is under preparation.

SINTON (J. A.). **Infection with *Nuttallia ninense* among Hedgehogs in the North-West Frontier Province, India.**—*Ind. Med. Jl. Res., Calcutta,* ix, no. 2, October 1921, pp. 359–363, 2 plates.

Hedgehogs (*Erinaceus* sp.) from the North-West Frontier have been found to be infected with a piroplasm that is almost certainly the same as that from *Erinaceus europaeus* in Russia, described by Yakimoff as *Piroplasma ninense*. The various forms of it are described. On account of the resemblance of this parasite to *Nuttallia equi* it was thought possible that it might be identical, in which case the hedgehog might act as a reservoir for infections of equine piroplasmosis, but Yakimoff's infection experiments with a foal, a dog, rabbits, and various other animals gave negative results.

AWATI (P. R.). **Some Notes on *Conorhinus rubrofasciatus* (De Geer).**—*Ind. Jl. Med. Res., Calcutta,* ix, no. 2, October 1921, pp. 371–373.

When *Triatoma* (*Conorhinus*) *rubrofasciata* was suggested by Donovan as a possible carrier of kala-azar [*R. A.E.*, B, i, 208], it was pointed out that neither the adult bug nor any of its early stages were found in houses. This species is, however, now recorded from houses in various villages of the infected area in Assam, some individuals containing ingested mammalian blood. None was found in an area supposed to be free from kala-azar.

CRAGG (F. W.). **The Geographical Distribution of the Indian Rat Fleas as a Factor in the Epidemiology of Plague: Preliminary Observations.**—*Ind. Jl. Med. Res., Calcutta,* ix, no. 2, October 1921, pp. 374–398, 1 plate, 1 map, 8 tables, 3 charts.

In an earlier paper the author discussed the distribution of the Indian species of the genus *Xenopsylla* with reference to the immunity of certain areas from plague epidemics [*R. A.E.*, B, ix, 125]; in the present paper the subject is more fully dealt with. The reasonable forecast, after the introduction of plague into Bombay in 1896, would have been that the disease would spread rapidly until the whole country was involved, since rats occur practically everywhere throughout the country and all the rats harbour fleas. The failure of the disease to appear in certain areas is, however, a striking fact. Although various factors may be more or less favourable to the rat-flea in different parts of the country, it can be decisively affirmed that there is practically no part where the known conditions are definitely and permanently against the establishment of an epidemic, and the escape of large and populous areas for many years cannot be explained on the facts at present known. The observations here recorded indicate that the missing factor is the geographical distribution of the species of *Xenopsylla*. Of these, there are three, namely: *X. astia*, *X. brasiliensis*, and *X. cheopis*. *X. astia* was recorded in 1913 as the common rat-flea of Colombo, and as predominating in Madras; the author has worked on the theory that these species may be unequally distributed and may not be equally efficient as vectors of plague, He therefore secured collections of rat-fleas in the Punjab, Madras and Bombay Presidencies, Central India and Burma. A total of 17,358 fleas was examined, the technique employed being described. The results, given in tables, show that *X. astia* and *X. cheopis* are both common fleas in those parts of India, 53·9 per cent. of those examined being *X. cheopis* and 36 per cent. *X. astia*; minor species being *X. brasiliensis* (7·7 per cent.), *Ceratophyllus* (2·1 per cent.), and *Leptopsylla musculi* (0·3 per cent.). The tables show that the distribution of the three main species is very irregular, and, in the case of *X. astia* and *X. cheopis*, is not clearly correlated with any of the factors that ordinarily govern the geographical distribution of animals. The case of *X. brasiliensis* is less obscure.

India may be regarded as consisting, roughly, of Peninsular India (the tableland of the Centre and South) and Extra-Peninsular India (the Indo-Gangetic Plain extending from the coast to the foot of the Himalayas on either side of the Peninsular and rising only a few hundred feet above sea-level). The habitat of *X. brasiliensis* is clearly Peninsular India, the characteristics of which are the absence of extremes of temperature and moderate humidity. *Ceratophyllus punjabensis* and *X. brasiliensis* were not found to occur together. *X. astia* and *X. cheopis* occur equally in the Peninsular and Extra-Peninsular portions, but it is evident that *X. cheopis* is the commoner species in the Punjab, and *X. astia* on the Madras Coast; in some stations on the Peninsular *X. astia* seems to be replaced by *X. brasiliensis*; all batches of fleas containing *X. brasiliensis* also contain *X. cheopis*. A map, showing the means of temperature and humidity, indicates the bearing of climate on the relative prevalence of the chief species; the Punjab stations with an annual mean temperature of less than 77·5° F. show a high percentage of *X. cheopis*; those with a mean annual temperature of 77·5 to 79° F. show a higher proportion of *X. astia*. Of 1,421 fleas sent from Akyab, however, only 2·2 per cent. were *X. cheopis*, while at Rangoon, not far distant and with a similar climate, the numbers of this species and of *X. astia* were equal; this and other examples clearly show that it is not possible to correlate the constitution of the flea population with climatic and geographical conditions. Unfortunately the collections are insufficient to allow of conclusions being drawn regarding seasonal prevalence of the species; indications are that *X. cheopis* rises to a higher prevalence during low temperature and a high degree of humidity than either *X. astia* or *X. brasiliensis*.

An examination of the hosts from which the fleas were obtained shows that either *X. astia* or *X. cheopis* may exist on any one of several rodents, as would be expected.

Of the other rat-fleas, eight species of *Ceratophyllus* have been recorded from rats and squirrels in India, of which *C. fasciatus*, common on rats in Europe, is very rare. *C. punjabensis* was fairly abundant throughout the Punjab, but disappeared during the hot weather; *C. nilgiriensis* occurred in numbers in Madras. The genus was represented by only one individual in collections from Bombay. *L. musculi* was found only at Ootacamund. The absence of fleas other than rat-fleas proved remarkable; only ten individuals of *Ctenocephalus felis* (the common flea of dogs and cats in India) occurred, and not a single *Pulex*.

As regards the relation of rat-fleas to the epidemiology of plague, the present observations are not sufficient for conclusive results, but are nevertheless remarkable. *X. astia* and *X. cheopis* together make up 90 per cent. of the total number of fleas present, and there appears to be a close relation between the predominance of *X. cheopis* and high plague mortality. *X. cheopis,* in fact, is clearly indicated as the true "plague flea," while *X. astia* predominates in the areas that have remained free from plague or have suffered only lightly. The Punjab has throughout been the most heavily infected part of India; this region shows 3,386 individuals of *X. cheopis* in the collections against 2,017 of *X. astia*; in certain districts of the Punjab, however, the plague incidence has been light, and there *X. astia* usually predominated. Observations with regard to *X. brasiliensis* and *Ceratophyllus* are not sufficient to justify any inference.

If more extended examination and the addition of more precise data confirm the theory that *X. cheopis* is the plague flea, while *X. astia* is not a carrier, it will be possible by examining the fleas of any locality to estimate precisely its liability to plague, and, in fact, to map out *X. cheopis*-belts, just as tsetse-belts have been mapped out in Africa. Moreover, the significance of an imported case of plague will depend largely on the local species of flea.

Hoffmann (W. H.). *Chrysops costata,* **a Blood-sucking Fly from Cuba.** —*Amer. Jl. Trop. Med., Baltimore,* i, no. 5, September 1921, pp. 311–312.

Observations are recorded on a blood-sucking fly which repeatedly attacked the author in Havana during the cool and dry season from November to March. It was unknown to the residents, but has been identified as *Chrysops costata,* F. It bites at all times of the day, and always attacks the head.

Roubaud (E.). **La Fermentation du Tas de Fumier au Service de la Basse-Cour dans la Lutte contre les Mouches.**—*Bull. Mus. Natnl., Hist. Nat., Paris,* 1921, no. 1, pp. 48–52, 1 fig.

Numerous larvae of *Musca domestica* are destroyed by fowls. Experiments show that this number may be further increased by enclosing manure heaps at the sides. When fermentation begins, the larvae in the enclosed heap are forced to come to the surface, where poultry can destroy them; whereas should the sides be exposed, a large number of larvae will be able to migrate and escape destruction.

Friederichs (K.). **Untersuchungen über Simuliiden. (Teil II.)** [Investigations on Simuliids. Part II.]—*Zeitschr. angew. Ent., Berlin,* viii, no. 1, September 1921, pp. 31–92, 11 figs.

The first part of this paper has already been noticed [*R.A.E.*, B, viii, 134] as have some notes published subsequently [*R.A.E.*, B, viii, 215; ix, 36, 104]. The keys to German Simuliids hitherto available are unsatisfactory, but as a result of additional material the author considers that information for this purpose is now sufficient as regards the following species: *Simulium ornatum*, Mg., *S. monticola*, Friederichs, *S. austeni*, Edw., *S. nölleri*, sp. n., *S. variegatum*, Mg. (*benefica*, Friederichs), *S. argyreatum*, Mg., *S. reptans*, L., *S. auricoma*, Mg., *S. costatum*, Friederichs, *S. latipes*, Mg., *S. aureum*, Fries, *S. angustipes*, Edw., *S. maculatum*, Mg., and *S. hirtipes*, Fries. The adults, larvae and pupae of these are described, with keys to the pupae and adults.

The German species may be divided into two groups, though this is not entirely satisfactory. Enderlein's proposal to replace the genus *Simulium* by two subfamilies and no less than fifteen genera [*R. A.E.*, B, ix, 104] is not likely to be generally accepted.

The distribution of Simuliids in parts of Hanover, Mecklenburg, Hamburg and the Harz Mountains is recorded in detail. Waters in which Simuliids breed usually contain several species together. There is scarcely a stream too small for some species, while broad rivers may be infested if they are shallow and contain vegetation. Entirely shaded streams or parts of streams are avoided, but for some species quite a slight current suffices. In general, certain species are connected with streams of a certain size and character. The smaller German species (*S. argyreatum* and *S. reptans*) seem chiefly to inhabit rivers, while the largest species (*S. ornatum*) is usually found in small streams.

In Germany the flight-period of Simuliids extends from April to October. The date at which the pupae occur is given for thirteen species, and as the pupal period is short, this also indicates the occurrence of the adults.

In north-eastern Mecklenburg the species most common there, *S. ornatum*, *S. ornatum pratorum*, subsp. n., and *S. aureum*, do not suck blood of warm-blooded animals, and perhaps suck no blood at all. On one occasion, however, a female of *S. ornatum nitidifrons*, Edw., was observed to take blood.

S. monticola is recorded as biting horses in the Harz. Nöller recorded that *S. nölleri* bites cattle, but the specimens collected from cattle by him do not belong to this species. *S. reptans* has long been known as a pest. *S. argyreatum* is the most dangerous species in Hanover. *S. maculatum* probably plays some part in outbreaks, but the absence of fatal cases in cattle in districts where it predominates points to its being less dangerous than *S. argyreatum*. It has been noticed biting horses. Man is only occasionally attacked in Germany, *S. ornatum nitidifrons* being one of the species concerned.

BRESSLAU (E.). **Ueber ein angebliches Fliegenbekämpfungsmittel.** [An alleged effective Fly-destroying Preparation.]—*Zeitschr. angew. Ent., Berlin*, viii, no. 1, September 1921, pp. 176–178.

Referring to the memorandum submitted to the German Imperial Chancellor requesting the prohibition of the sale of remedies for plant pests and diseases [*R. A.E.*, A, viii, 467] unless they have been duly authorised, the author asks that the matter of control of pests other than those of plants should be included within its scope. A preparation called "Hidot," claimed to have as its active principle the fungus *Empusa muscae*, was tested against flies with entirely negative results.

ZUELZER (M.). **Beiträge zur Biologie von** *Argas persicus*, **Wldh.** [Contributions to the Biology of *A. persicus*.]—*Arb. aus dem Reichsgesundheitsamt*, lii, no. 1, 1920. (Abstract in *Zeitschr. angew. Ent., Berlin*, viii, no. 1, September 1921, p. 225.)

The absorption of food by *Argas persicus*, lasting from 20 minutes to one hour, increases the volume of the body fourfold. After feeding on a fowl, any excess of albumen is passed unchanged through the coxal glands, and it is possible that spirochaetes ingested with blood may pass these glands without hindrance. Defecation occurs 1–2 hours after feeding. The female is particularly likely to mate after a blood-meal. On an average one hundred eggs are laid. After 20–25 days, according to the temperature, a six-legged larva hatches, and there are three eight-legged nymphal stages.

NÖLLER (W.). **Die Behandlung der Pferderäude mit Schwefeldioxyd.** [The Treatment of Horse Mange with Sulphur Dioxide.]—*Berlin*, Verlag R. Schoetz, 1919, 63 pp., 11 figs., etc. Price M. 3·60. (Notice in *Zeitschr. angew. Ent., Berlin*, viii, no. 1, September 1921, pp. 225–226).

As a result of experience gained in treating 70,000 horses this book gives a considerable amount of information on the subject of fumigation with sulphur dioxide against mange. The qualities and action of sulphur dioxide (SO_2), the practical details of fumigation and the merits of the various forms of gas chambers are discussed For fumigation to be successful the temperature should not be below 68° F., as the mites breathe very little at low temperatures and thus escape the action of the gas, nor should it be above 104° F., or the horses will sweat.

MEGAW (J. W. D.). **A Typhus-like Fever in India, possibly transmitted by Ticks.**—*Ind. Med. Gaz., Calcutta*, lvi, no. 10, October 1921, pp. 361–371.

The first part of this paper consists of a summary of a report by Lieut.-Col. McKechnie of a fever studied by him in the districts of Sat Tal and Bhim Tal (small hill stations at a height of some 4,500 ft. in the Kumaon Division). After studying a number of cases, he was forced to the conclusion that the disease in question was typhus. From McKechnie's observations and his own experiences the author is quite convinced that the fever belongs to the typhus group, and discusses the possibilities of ticks or lice being the carriers. Points in favour of the tick hypothesis are that in two of the cases in the author's experience there was a tick bite previous to the attack; that the fever very closely resembles Rocky Mountain fever, which is known to be tick-borne; that in all the cases reported in India tick bites might quite probably have occurred; that the incidence of the disease appears to be quite different from that of louse-borne maladies; and that the disease appears to be strictly confined to certain localities year after year. If it were due to lice it could hardly remain so localised among a distinctly migratory population. Moreover, the freedom of Europeans from louse-borne fever indicates that such infection is not readily communicated to them under the hygienic conditions in which they live. Against the tick theory is the fact that there is no direct evidence of tick bite.

The author strongly suspects that the disease is one affecting animals of the jungle and that it is conveyed to man by a tick, the disease being either the same as Rocky Mountain fever or very closely related to it. It is probably widely distributed in India and other parts of the world, but is frequently mistaken for typhoid fever. Further research in connection with the disease is urgently needed, and meantime precautions against tick bite should be taken in the affected localities on the lines that have proved successful in the Rocky Mountains.

MEGAW (J. W. D.). **A Note on the Twelve-day Fever of Nigeria.**—*Ind. Med. Gaz., Calcutta*, lvi, no. 10, October 1921, pp. 371–373.

The author comments on a recent record of a newly discovered fever of 12 days' duration in Nigeria [*R. A. E.*, B, ix, 195]. He considers that the disease as described differs in many points from dengue fever, but, on the other hand, corresponds in every essential with the fever described in the previous paper by McKechnie and by himself as a fever of the typhus group, probably carried by a tick. He hopes that further light may be thrown on this question, and remarks that a similar fever was described a few years ago by McNaught in South Africa.

TRYON (H.). **Special Cattle Fatality in the Maranoa District, and its Relation to the Larvae of** *Pterygophorus analis*, **Costa.**—*Queensland Agric. Jl.*, *Brisbane*, xvi, pt. 3, September 1921, pp. 208–216, 2 plates.

A fatal disease of cattle in the Maranoa district results from their eating the larvae of a sawfly, *Pterygophorus analis*, Costa, which is fully described in this paper.

The silver-leaved ironbark tree (*Eucalyptus melanophloia*) is the principal food-plant. Twelve or more eggs are laid at a time in the tissue between the leaf surfaces in a row along the leaf-edge. The larvae feed on the leaves and when mature, late in June, they crawl to the ground, congregating in heaps at the base of the tree. They enter the soil to pupate, and they are still gregarious in this stage, except in sandy soil. Ordinarily the adults emerge late in August or in September, but under drought conditions much later.

The natural enemies of this pest include opossums, which feed on the leaves on which the eggs are deposited. Unfortunately numbers of opossums have been destroyed in recent years, which accounts for the prevalence of the sawfly. A Tachinid fly parasitises the larvae, and insectivorous birds, which occur in numbers locally, are also powerful checks. Under drought conditions pupation is retarded, and the larvae often succumb to fungus and other diseases, while wet weather kills them before they enter the ground.

Cattle congregate at the foot of the trees, and eagerly consume the insects, chiefly dead and decaying ones, in preference to grass. This abnormal appetite is perhaps due to some factor of diet deficiency; in one paddock, which had been salted, the cattle ignored the sawfly larvae. Cattle of all ages are affected and they usually die within two or three days, though some have been known to survive. The symptoms apparently were not those of a local irritation such as arises from the consumption of hairy caterpillars, but rather those of a general toxaemia. Cattle should be removed from pastures where the food-plant grows, or the latter should be destroyed on land permanently devoted to grazing. Boughs placed at the bases of the trees will prevent cattle from reaching the insects, and spraying the masses of larvae with a strongly odorous substance or bone-oil might make them repellent. Investigations should be undertaken for the direct treatment of cattle.

JOHNSTON (T. H.) & TIEGS (O. W.). **New and little-known Sarcophagid Flies from South Eastern Queensland.**—*Proc. R. Soc. Queensland, Brisbane*, xxxiii, no. 4, 18th July 1921, pp. 46–90, 26 figs. [Received 31st October 1921.]

The literature on the various species of Sarcophagid flies from Queensland is reviewed in this paper. The following are described: *Helicobia australis*, sp. n., bred from decaying meat; *Sarcophaga*

impatiens, Wlk., *S. tryoni*, sp. n. (*frontalis*, in part, of Australian authors), *S. alpha*, sp. n., *S. beta*, sp. n., *S. gamma*, sp. n., *S. irrequieta*, Wlk., (*ochripalpis*, Thomson), *S. eta*, sp. n., *S. misera*, Wlk. (*frontalis*, Thomson), *S. misera*, Wlk., var. *dux*, Thomson (*subtuberosa*, Parker), *S. aurifrons*, Macq., *S. zeta*, sp. n., *S. theta*, sp. n., *S. iota*, sp. n., *S. kappa*, sp. n., *S. sigma*, sp. n., and *S.* (*Parasarcophaga*) *omega*, subgen. et sp. n., bred from bad meat ; *S. delta*, sp. n., found on flowers ; *S. omikron*, sp. n., bred from wool and rotten potatoes ; *S. froggatti*, Taylor (*knabi*, Parker) ; and *S. bancrofti*, sp. n.

STRONG (W. M.). *Phlebotomus* **Flies in Papua.**—*Med. Jl. Australia, Sydney*, 8th Yr., ii, no. 10, 3rd September 1921, p. 193.

A species of *Phlebotomus* greatly resembling *P. pappatasii* is recorded from Papua. It is probably the transmitter of three-day fever. This species may also occur in tropical Australia. The points of difference between it and *P. pappatasii* are described.

SWELLENGREBEL (N. H.). **De Anophelinen van Nederlandsch Oost-Indië.** [The Anophelines of the Dutch East Indies.]—*Kolon. Inst. te Amsterdam*, Meded., no. XV, Afdeeling Trop. Hygiene no. 10, 1921, x+155 pp., 76 text figs., 20 plates. [Price *fl.* 6·50]

This is a revised edition of the monograph already noticed [*R. A.E.*, B, vii, 19] which was later completed and amended [B, viii, 136]. As regards the pathogenic importance of the various mosquitos much uncertain information included in the first edition has been removed, and of the Anophelines of neighbouring countries only those of Malacca and New Guinea are mentioned, as the identity of the others is too little known.

FERNANDEZ (S.). **L'Allevamento dei Pipistrelli per distruggere le Zanzare.** [The Breeding of Bats for the Destruction of Mosquitos.]—*Cronica Med.-Quirurgica de la Habana*, xlvii, no 3, March 1921, pp. 79–84. (Abstract in *Ann. d'Igiene, Rome*, xxxi, no. 9, September 1921, pp. 579–580.)

The author advocates the breeding of bats as mosquito-destroyers by providing suitable shelters and protection against rats and mice, as had been suggested in the United States [*R. A.E.*, B, i, 176 ; but *cf.* viii, 203].

PIATTI (—). **Azione della Chloropicrina.** [The Action of Chloropicrin.]—*Riv. di Ampel., Leghorn*, no. 9. (Abstract in *Riv. Agric., Parma*, xxvi, no. 41, 14th October 1921, pp. 593–594.)

Experiments in destroying rats with chloropicrin were made in 1917 in the laboratory and on two steamers with holds of about 28,000 and 38,000 cu. ft. capacity.

The liquid was contained in a galvanised tank placed on deck, and fell drop by drop into tubes containing cotton and hanging in the hold. Using 900 cc. of chloropicrin all rats placed at various heights in the hold were killed in 2½ hours.

Bertrand's experiments [*R. A.E.*, B, viii, 76], made with higher concentrations of chloropicrin, confirm these results and show that the rat-fleas are killed before their hosts, a point of the utmost importance in anti-plague work.

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